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CONTRIBUTIONS TO THE TAXONOMY OF WEST EUROPEAN AND NORTH AFRICAN *STENAMMA* OF *WESTWOODII* SPECIES-GROUP (HYMENOPTERA FORMICIDAE)

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In copertina: *Stenamma debile* (Foerster, 1850). Line drawing by F. Rigato.

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Contributions to the taxonomy of West European and North African *Stenamma* of the *westwoodii* species-group. (Hymenoptera Formicidae)

Abstract - The taxonomy of West European and North African *Stenamma* belonging to the *Stenamma westwoodii* species-group is reviewed. *Stenamma orousseti* Casevitz-Weulersse is discussed and synonymised with *S. debile* (Foerster). Principal diagnostic features of the poorly known *Stenamma sardoum* Emery and *S. petiolatum* Emery are provided as well as comments about the taxonomic position of all other species in the group. Two new species, *Stenamma siculum*, based on gynes and males from Sicily, and *Stenamma zanoni*, based on workers and isolated males from North Italy and South Switzerland, are described. In addition, *S. africanum* Santschi is resurrected from synonymy with *S. msilanum* Forel and the infraspecific form *S. africanum submuticum* Santschi is included in the synonymy of *africanum*. Keys to known workers, gynes and males are provided.

Key words: Formicidae, *Stenamma*, West Palaearctic, review, new species, dichotomous keys.

Riassunto - Contributi alla tassonomia degli *Stenamma* dell'Europa occidentale e del Nord Africa appartenenti al gruppo *westwoodii*. (Hymenoptera Formicidae).

Viene riesaminata la tassonomia degli *Stenamma* dell'Europa occidentale e del Nord Africa appartenenti al gruppo *westwoodii*. *Stenamma orousseti* Casevitz-Weulersse è discusso e posto in sinonimia con *S. debile* (Foerster). Sono forniti i principali caratteri distintivi dei poco conosciuti *Stenamma sardoum* Emery e *S. petiolatum* Emery, così come i commenti sulla posizione tassonomica di tutte le specie del gruppo. Vengono descritte due nuove specie, *Stenamma siculum*, sulla base di regine e maschi di Sicilia, e *Stenamma zanoni*, sulla base di operaie e maschi isolati dell'Italia settentrionale e della Svizzera meridionale. Inoltre, *S. africanum* Santschi è riconosciuto come specie valida e rimosso dalla sinonimia con *S. msilanum* Forel e la sottospecie *S. africanum submuticum* Santschi è inclusa nella sinonimia di *africanum*. Vengono fornite le chiavi dicotomiche per il riconoscimento di operaie, regine e maschi.

Parole chiave: Formicidae, *Stenamma*, regione paleartica occidentale, revisione, nuove specie, chiavi dicotomiche.

INTRODUCTION

The present knowledge of the taxonomy of the genus *Stenamma* is mostly unsatisfactory, especially because the species of this genus have cryptic habits and are rarely collected. Therefore, adequate comparisons between taxa and/or populations often cannot be supported by a sufficient number of specimens. The genus mostly has a Holarctic distribution with a moderate number of species occurring in the Neotropics (Branstetter, 2009). Branstetter (l.c) has provided a synonymic list of all known species as well as a comprehensive review and discussion of genus level characters.

The unique recent taxonomic revision of Palaearctic species was provided by DuBois (1998). Unfortunately, that work often proves to be fairly weak (at least for the species dealt with in this paper) when one attempts to identify specimens through keys and descriptions provided by the author.

After detailed examination of specimens of Italian *Stenamma* I realized that the diagnoses of some taxa were still poor and needed clarification.

In particular, I obtained a series of *Stenamma* specimens from Sardinia, which at first I could not assign to any of the usually identifiable species (*S. debile*, *S. striatulum*, *S. petiolatum*) nor to *S. sardoum*, as that species was usually interpreted. Following an examination of type-material of *S. sardoum* I realized those Sardinian specimens belonged to it and that Emery (1915), Casevitz-Weulersse (1990) and DuBois (1998) were misleading about the diagnostic features of that species, especially concerning the shape of the petiolar node. Therefore, I present a new diagnosis of *S. sardoum* as well as of *S. petiolatum*, which also seems to be somewhat misunderstood.

In addition, I obtained several males and gynes of an unidentifiable species collected together with alates of *S. debile* from Sicily. Initially, I considered that they could belong either to *S. sardoum* or to *S. msilanum* (*sensu* DuBois, 1998); but the presence of a series of standing hairs along the dorsal edge of the scape leads me to assign them to a new species, *S. siculum*.

Moreover, some workers of a relatively large *Stenamma* from Northeast Italy deserve to be considered as a new species, *S. zanoni*, together with two specimens from Canton Ticino, Switzerland, one of which was erroneously determined as *S. petiolatum* by Della Santa (1988). The male specimen that Kutter (1971) assigned to *S. petiolatum* is also considered to belong here, as well as another isolated male collected in the neighbourhood of Milano.

Finally, I examined type specimens of the North African *S. africanum* Santschi and of its current senior synonym *S. msilanum* Forel. I determined that these should be treated as separate taxa as the synonymy proposed by DuBois (1998) is untenable.

This paper is therefore designed to give a better framework to the taxonomy of West European and North African *Stenamma* of the *S. westwoodii* species-group (as defined by DuBois, 1998). It provides some new diagnostic characters, together with a study of known males, and new keys to female castes and males are provided.

In many cases only a few specimens were available for examination; therefore, measurements and indices are to some extent provisional as they may not cover the full range of variation possible in the species.

MATERIALS AND METHODS

Measurements and indices

All measurements were taken by a stereomicroscope Leica MZ9₅ with an ocular micrometre and carrier AX in order to work on a single axial optical path and get more accurate data.

TL (Total length): the full outstretched length of the specimen, with fully closed mandibles, from the anteriormost mandibular border to the gastral apex. It is the sum of: length of the head (including mandibles) + AL + PeL + PPL + length of the gaster.

HL (Head length): in full face view, the maximum length of the head from the anterior clypeal margin to the posterior margin of the head. Whenever clypeus and/or posterior margin are concave in the middle, this measurement is taken at an imaginary line tangent to the most protruding points.

HW (Head width): in full face view, just behind the eyes.

CI (Cephalic index): HWx100/HL.

SL (Scape length): the length of the scape as a straight line between its apex and base, excluding the basalmost condylar bulb and "neck".

SI (Scape index): SLx100/HW.

PCI (Posterior clypeal index): in female castes, the ratio between the minimum width of the posterior portion of the clypeus between the frontal lobes and the width of the frons across the latter at the level of the antennal insertion (see Seifert, 2007: 143).

PnW (Pronotal width): the maximum width of the pronotum in dorsal view.

AL (Mesosoma length): in profile, the distance from the point where the dorsum of the pronotum meets the cervical shield to the most protruding portion of the propodeal lobe.

PSI (Propodeal spine index): in female castes, with the mesosoma in profile, the ratio between the distance from a propodeal spine's tip and the centre of the propodeal spiracle divided by the minimum distance between the latter and the propodeal declivity. (This is the original index as proposed by Buschinger (1966); although Casevitz-Weulersse (1990) called Buschinger's Index a very similar measurement using the posterior rim of the propodeal spiracle as a reference. Such a difference is mostly negligible).

ScW (Scutum width): in gyne and male the maximum width of the mesonotal scutum in dorsal view.

MnL (Mesonotum length): in gyne and male the combined length of mesonotal scutum and scutellum in dorsal view.

PeL (Petiolar length): in profile, the length of the petiole from the anteriormost visible point where it "meets" the propodeal lobe to the posterior margin (Fig. 1).

PPL (Postpetiolar length): in profile, the distance from the base of the node, just behind the helcium, to the posteriormost margin (Fig. 1). Because of differences in specimens mounting and waist position this measurement may be unreliable. Consequently, I used as an anterior point the base of the postpetiolar node, which is not concealed even when the waist is fully outstretched.

PeH (Petiolar height): in profile, from the top of the node to the sternal surface just below it (Fig. 1).

PPH (Postpetiolar height): in profile, from the top of the postpetiolar node to the sternal surface (Fig. 1).

PeW (petiolar width): in dorsal view, the maximum width of the petiole.

PPW (Postpetiolar width): in dorsal view, the maximum width of the postpetiole.

PI1 (Petiolar index 1): PPLx100/PeL.

PI2 (Petiolar index 2): PeLx100/HW.

MTL (Metatibial length): the maximum length of the hind tibia excluding the proximal articulation, which is concealed when the leg is outstretched.

TI (Tibial index): MTLx100/HW.

Morphometric data are summarized in tables 1, 2 and 3.

Images

Digital colour photos were taken by a Canon Power Shot S50 mounted on an ocular tube of a Leica MS5 stereomicroscope with PlanAPO 1.0x objective and carrier AX; several shots of each specimen were combined together through Helicon Focus software.

B/W photographs were taken of uncoated specimens by a Jeol 5610 LV Scanning Electron Microscope using a backscattered signal at low vacuum.
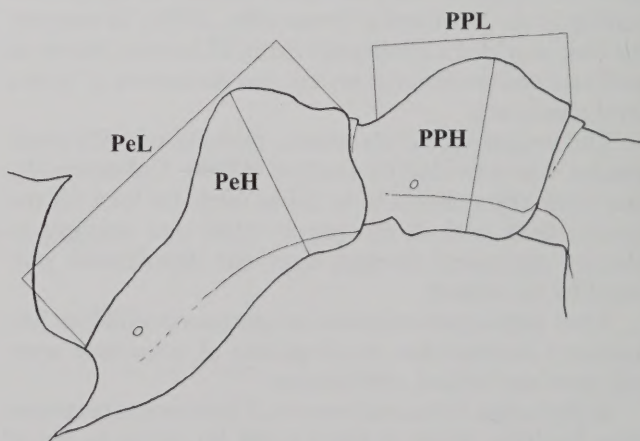
Fig. 1 - Measurements of waist in profile. / Misure del peduncolo in profilo. (Drawing / Disegno F. Rigato).

Depositories

BMNH: The Natural History Museum, London, United Kingdom
CNBF: Centro Nazionale per lo Studio e la Conservazione della Biodiversità Forestale, Verona, Italy
MHNG: Muséum d'Histoire Naturelle, Geneva, Switzerland
MNHN: Muséum National d'Histoire Naturelle, Paris, France
MNHU: Museum für Naturkunde der Humboldt-Universität, Berlin, Germany
MSNG: Museo Civico di Storia Naturale, Genova, Italy
MSNM: Museo Civico di Storia Naturale, Milano, Italy
MZL: Musée de Zoologie, Lausanne, Switzerland
OUMNH: Hope Entomological Collections, Oxford University Museum of Natural History, Oxford, UK
SIZK: Shmalhausen Institute of Zoology Ukrainian National Academy of Sciences, Kiev, Ukraine
ZMMU: Zoological Museum of Moskow University, Russia

THE *STENAMMA WESTWOODII* SPECIES-GROUP

In absence of a comprehensive revision of the genus (see also Branstetter, 2009), I follow DuBois (1998) in assigning all of the species dealt with in this paper to the *westwoodii* species-group. The female castes of these species are morphologically similar and share the following features:

a) head and mesosoma distinctly rugose, usually with moderately developed ground sculpture, especially on the head dorsum;
b) mandibles with 7 to 10 teeth and denticles;
c) anterior clypeal margin weakly to hardly notched in the middle when seen from above;
d) worker with eyes very small to minute, with no more than 5-6 ommatidia in the longest row;
e) propodeal teeth small to moderately developed and spine-like;
f) petiole with a reduced to absent anteroventral process;
g) basigastral costulae present on abdominal tergite IV;
h) pilosity moderately abundant throughout;
i) colour ferrugineous to brown.

Besides the species dealt with in this paper, DuBois (1998: 225) listed further 7 species in the *westwoodii*-group. Each of these species is reported from a limited region and their overall distribution ranges from the Russian East coast of the Black Sea and Caucasus to the mountains of Kashmir. At present, among the West European and Mediterranean *Stenamma*, only the widespread *S. debile* and *S. striatulum* have been reported as far East as West Russia and East Anatolia respectively, and could even co-occur with any of the "eastern" species, but there are no published records supporting that.

Among West European and North African *Stenamma* a single species is excluded from the *westwoodii*-group (DuBois, 1998):

S. punctiventre Emery, 1908
= *Theryella myops* Santschi, 1921

This taxon belongs in its own group, the *punctiventre* species-group, is known from Morocco and, as distinctive features, has 6-toothed mandibles, a strong and projecting anteroventral petiolar process and no basigastral costulae (DuBois, 1998).

Variable versus consistent morphological features

When considering species limits in the *westwoodi* species-group, I discovered that several morphological features vary within species and are unreliable for classification. The number of mandibular teeth and denticles in workers can be inconsistent, usually ranging from 7 to 9, and a single specimen may have left and right mandibles bearing different dentitions. The abundant pubescence of the appendages is more or less raised above the surface (Fig. 71), ranging from appressed to decumbent even in the same nest series. Eyes too are often variable in size, and strongly different counts of numbers of ommatidia may occur between right and left eye of the same specimen; in addition, ommatidia are often poorly delimited and difficult to count.

For the species dealt with in this paper I consider as more consistent and reliable features in workers (and, at least partially, in gynes) the main pattern of sculpturation on head and promesonotal dorsum, the SI, and the shape of petiole and postpetiole in profile. In addition, males, although rarely collected, seem to have more easily recognisable external features, especially the shape of the mandibles and the sculpturation of the propodeal dorsum. In one species (*S. zanoni* n. sp.) the male almost lacks notauli, which are instead easily visible in males of other species.

In some species of *Stenamma* a moderate number of standing hairs on scapes and tibiae is present in addition to the ordinary pubescence (Figs. 48, 72) and that feature seems consistent in conspecific female castes and male. As pubescence in *Stenamma* is relatively long (Fig. 71), the distinction between it and standing (subdecumbent to suberect) setae may often appear somewhat difficult. However, all of the examined specimens of species bearing those standing setae (i.e. *S. petiolatum*, *siculum* and *zanoni*) have their scapes and tibiae appearing with a dinstinctively heterogenous pilosity when compared, for instance, with specimens of *S. debile* or *striatulum*. In the latter, as well as other species legs and antennae always have a regularly arranged, tidy pubescence.

Synopsis of *S. westwoodii*-group in West Europe and North Africa

africanum Santschi, 1939 **stat. rev.**
= *africanum* var. *submuticum* Santschi, 1939 **syn. n.**
debile (Foerster, 1850)
= *minkii* (Foerster, 1850)
= *golosejevi* Karavaiev, 1926
= *ucrainicum* Arnoldi, 1928

= *westwoodi* subsp. *polonicum* Begdon, 1932
= *orousseti* Casevitz-Weulersse, 1990 **syn. n.**
msilanum Forel, 1901
petiolatum Emery, 1897
sardoum Emery, 1915
siculum Rigato **sp. n.**
striatulum Emery, 1895
= *tscherkessicum* Arnoldi, 1928
westwoodii Westwood, 1839
zanoni Rigato **sp. n.**

Keys to West European and North African *Stenamma* of the *S. westwoodii* species-group

(Note that keys to gynes and males are based on one or very few specimens and must be considered as provisional)

Workers
(workers of *S. siculum* and *S. msilanum* unknown)

1 Size usually larger (worker: TL ≥ 4.2, HL ≥ 0.94), dorsal face of scapes and extensor surface of meso- and metatibiae with few to several sparse, subdecumbent to suberect hairs in addition to the ordinary appressed to decumbent pubescence (Fig. 72) 2
\- Size usually smaller (worker: TL ≤ 4.3, HL ≤ 0.94), dorsal face of scapes and extensor surface of meso- and metatibiae with appressed to decumbent pubescence only (Fig. 71) 3
2 Size larger (TL around 5.0), body and appendages more slender (SI > 100, TI > 95), propodeum armed with relatively long and apically blunt spines which obliquely raise from the propodeal angles (Figs. 3, 10); postpetiole elongate, distinctly longer than high (Fig. 25). (Italy) .... *S. petiolatum*
\- Size smaller (TL mostly around 4.5), body and appendages relatively shorter (SI < 100, TI around 90), propodeum simply toothed, when teeth are more developed they are somewhat upturned and nearly perpendicular to the propodeal dorsum (Figs. 7, 14); postpetiole stout, about as high as long (Fig. 29). (N Italy, S Switzerland) .... *S. zanoni*
3 Sculpture on head and promesonotum finer, more regularly longitudinally arranged with rare anastomoses (Figs. 20, 34). Size small (TL < 3.5), propodeal spines usually longer (PSI > 1.50 to 2.00). (Widespread in S Europe and Turkey) .... *S. striatulum*
\- Sculpture on head and promesonotum coarser, with a less regular longitudinal pattern, head mostly areolate with many anastomoses (e.g. Figs. 19, 33). Size larger (mostly TL ≥ 3.5), propodeal spines usually shorter (PSI often ≤ 1.50, and never approaching 2.00) 4
4 Promesonotal rugosity mostly longitudinally arranged, transverse only anteriorly just behind the neck (Fig. 31). Appendages shorter (nearly always SI ≤ 90 and TI < 85); scapes never reaching the posterior margin of the head when completely laid back. Petiolar sternite hardly concave in profile at the level of the node. Postpetiolar sternite straight in profile (Fig. 24). Colour usually darker, brown. (Widespread in Europe and Turkey) .... *S. debile*
\- Promesonotal rugosity mostly irregular (Figs. 33, 35, 37), without a well defined longitudinal pattern, often forming a loose reticulum; if longitudinal rugulae prevail, they are strongly wandering. Appendages longer (nearly always SI ≥ 90 and TI > 85); scapes almost reaching, or even just reaching, the posterior margin of the head when completely laid back. Petiolar sternite weakly, but distinctly, concave in profile at the level of the node. Postpetiolar sternite in profile slightly, but distinctly concave (Figs. 26, 28, 30). Colour usually paler, ferrugineous 5
5 Posterior portion of clypeus between frontal lobes at the level of antennal insertions distinctly narrower than each frontal lobe, about 1/5 to almost 1/4 of frontal lobes distance (PCI < 25) (Fig. 21). Promesonotal dorsum with a distinct longitudinal irregular median carina mostly crossed by transverse irregular rugulae (Fig. 35). Postpetiole appearing higher and stouter (Fig. 28). (UK, France, The Netherlands, Belgium) .... *S. westwoodii*
\- Posterior portion of clypeus between frontal lobes at the level of antennal insertions about as wide as each frontal lobe, 1/4 to 1/3 of frontal lobes distance (nearly always PCI > 25) (Fig. 19). Promesonotal dorsum usually with an ill-defined or interrupted longitudinal median carina and irregularly widely reticulate rugose (Figs. 33, 37). Postpetiole lower and more slender (Figs. 26, 30) 6
6 SI ≥ 95. (Tunisia and Algeria) .... *S. africanum*
\- SI ≤ 96. (Italy: Sardinia) .... *S. sardoum*

Gynes
(gyne of *S. zanoni* unknown)

1 Size larger (TL > 5.0, HL > 1.00) with longer appendages (SI and TI > 100); scape distinctly surpassing the posterior margin of the head when laid back. Scapes and tibiae with several standing hairs, besides the usual pubescence .... *S. petiolatum*
\- Size smaller (usually TL ≤ 5.0 and HL ≤ 1.00) with shorter appendages (SI ≤ 100, TI < 100); scape at most just reaching the posterior margin of the head when laid back. Scapes and tibiae with appressed to decumbent pubescence only 2
2 Size smaller (TL < 4.0, HL ≤ 0.80); head rugulation finer and more regularly longitudinal (Fig. 49) .... *S. striatulum*
\- Size larger (TL ≥ 4.0, HL > 0.80); head surface mostly areolate (e.g. Figs. 44, 46) 3
3 SI < 85. Colour usually darker, brown .... *S. debile*
\- SI > 85, mostly ≥ 90. Colour usually paler, ferrugineous 4
4 Postpetiole in profile higher and stouter, about as high as long (PPL≈PPH) 5
\- Postpetiole in profile lower and more slender, distinctly longer than high (PPL>PPH) 7
5 PCI < 25 .... *S. westwoodii*
\- PCI > 30 6
6 Colour ferrugineous; SI > 90; petiolar sternite shallowly concave in profile .... *S. africanum*
\- Colour brown; SI < 90; petiolar sternite fully straight in profile .... *S. msilanum*
7 Scape reaching the posterior margin of the head when laid back (SI > 95) and with some standing hairs along its dorsal side (Fig. 48) .... *S. siculum*

- Scape not reaching the posterior margin of the head when laid back (SI < 95) and with no standing hairs along its dorsal side .... *S. sardoum*

Males

(Males of *S. petiolatum*, *S. sardoum* and *S. msilanum* unknown. *S. africanum*'s male, described by Cagniant (1971), excluded from this key because not seen and not safely assignable to that taxon)

1 Mandibles more or less reduced and with a short masticatory margin, usually armed with 3, 4 or 5 teeth and denticles. When at rest mandibles leave a distinct gap between their inner border and the anterior clypeal margin (Figs. 61, 64) 2
- Mandibles normally developed, strongly triangular, with at least 6 teeth and denticles. When at rest mandibles completely fill the space between their inner border and the anterior clypeal margin (Figs, 62, 63, 65) 3
2 Propodeal dorsum strongly reticulate-punctate with superimposed irregular transverse rugulation (Fig. 69). Size usually smaller (HL < 0.60) and mandibles triangular, 4- or 5-toothed .... *S. striatulum*
- Propodeal dorsum mostly smooth and shining (Fig. 66). Size usually larger (HL usually ≥ 0.60) and mandibles usually narrowly subrectangular to subtriangular and 3-toothed, but rarely even 2-, 4- or 5-toothed .... *S. debile*
3 Notauli vestigial (Fig. 67) .... *S. zanoni*
- Notauli distinct (Figs. 68, 70) 5
5 Propodeal dorsum reticulate-punctate with scattered rugulae (Fig. 68). Scape and petiole distinctly longer, SI > 50, PI2 > 75. Scape dorsally with some standing hairs, besides ordinary pubescence .... *S. siculum*
- Propodeal dorsum mostly smooth and shining (Fig. 70). Scape and petiole distinctly shorter, SI < 45, PI2 < 75. Scape with pubescence only .... *S. westwoodii*

***Stenamma debile* (Foerster)**

(Figs. 2, 8, 9, 16, 17, 24, 31, 38, 44, 51, 57, 61, 66, 71)

Myrmica debilis Foerster, 1850: 52. Holotype male, GERMANY: Rheinprovinz, Aachen (*Foerster*) (MNHU) [not examined].

Myrmica minkii Foerster, 1850: 63. Holotype worker, GERMANY: Rheinprovinz, Crefeld (*Foerster*) (MNHU) [not examined]. [Synonymy by DuBois, 1993: 314]

Stenamma debile (Foerster) Mayr, 1863: 454. [First combination in *Stenamma* Westwood and synonym of *Stenamma westwoodii* Westwood].

Stenamma debile (Foerster). DuBois, 1993: 314. [Revived from synonymy with *S. westwoodii*].

Stenamma golosejevi Karavaiev, 1926: 68. Holotype worker, UKRAINE: Goloseiev forest near Kiev, 13.vi.1926 (*Karavaiev*) (SIZK) [not examined]. [Synonymy by DuBois, 1998: 231].

Stenamma ucrainicum Arnol'di, 1928: 209, figs. 1-4. Syntype workers, gynes and males, UKRAINE, 40 km SE of Khar'kov (*Arnol'di*) (ZMMU) [not examined]. [Synonymy by DuBois, 1998: 231].

Stenamma westwoodi subsp. *polonicum* Begdon, 1932: 118, fig. 1. Syntype workers, POLAND: Pomerania. [not located and not examined]. [Synonymy by DuBois, 1993: 314].

Stenamma orousseti Casevitz-Weulersse, 1990: 141. Holotype worker, paratype workers, and paratype male, FRANCE: Corsica, Cap Corse, between Santa Lucia and Pino, 275 m, 15.iv.1984 (*Orousset*) (MNHN) [examined]. **Syn. n.**

Diagnostic features. Female castes have slightly shorter appendages than *S. westwoodii* and *S. sardoum* and, with rare exceptions, the worker has the promesonotum mainly longitudinally rugulose with rare anastomoses and an ill-defined median carina (Fig. 31). Petiolar and postpetiolar sternites in profile are usually straighter than in related taxa, and postpetiole is about as high as long. *S. debile* females are usually mainly brown, darker than most species considered in this paper. The male is quite distinct in its combination of narrow, usually 3-toothed mandibles, and unsculptured propodeal dorsum (Figs. 61, 66).

Measurements. Worker. TL 2.9–4.3; HL 0.68–0.97; HW 0.59–0.84; CI 82–90; SL 0.50–0.72; SI 79–91; PCI 24–33; PnW 0.40–0.55; AL 0.83–1.17; PSI 1.20–1.84; PeL 0.28–0.40; PPL 0.19–0.27; PeH 0.18–0.24; PPH 0.18–0.26; PeW 0.14–0.19; PPW 0.19–0.25; PI1 61–74; PI2 46–54; MTL 0.43–0.65; TI 72–83 (70 measured. For measurements of *S. orousseti* holotype, see below).

Gyne. TL 4.0–4.7; HL 0.82–0.93; HW 0.71–0.82; CI 84–91; SL 0.60–0.67; SI 79–86; PCI 26–35; AL 1.21–1.34; PSI 1.60–2.00; ScW 0.61–0.68; MnL 0.87–1.00; PeL 0.40–0.46; PPL 0.25–0.30; PeH 0.23–0.27; PPH 0.25–0.29; PeW 0.19–0.22; PPW 0.25–0.30; PI1 54–68; PI2 52–59; MTL 0.59–0.70; TI 77–87 (15 measured).

Male. TL 3.2–4.0; HL 0.55–0.67; HW 0.46–0.58; CI 83–88; SL 0.17–0.27; SI 37–55; AL 1.07–1.40; ScW 0.56–0.67; MnL 0.72–0.98; PeL 0.35–0.44; PPL 0.19–0.29; PeH 0.15–0.21; PPH 0.16–0.23; PeW 0.13–0.18; PPW 0.20–0.27; PI1 50–68; PI2 69–82; MTL 0.69–0.89; TI 142–163 (15 measured).

Discussion of *Stenamma orousseti* Casevitz-Weulersse, newly synonymised.

Holotype (worker, Figs. 9, 17). TL 3.4; HL 0.78; HW 0.67; CI 86; SL 0.56; SI 84; PCI 29; PnW 0.46; AL 0.94; PSI 1.61; PeL 0.31; PPL 0.22; PeH 0.20; PPH 0.21; PeW 0.15; PPW 0.21; PI1 71; PI2 49; MTL 0.49; TI 73.

Casevitz-Weulersse (1990) described *Stenamma orousseti* from workers, gynes and one isolated male collected in Corsica, but her description leaves some doubts about the validity of the species. For instance, Casevitz-Weulersse herself (l.c.: 147) recognized the weakness of the morphometric data she used to compare *S. orousseti* with its closest relatives *S. westwoodii* (i.e. *S. debile*) and *S. striatulum*. She also stated (l.c.: 147-148) that stronger support for *S. orousseti* would be in a forthcoming multivariate analysis of morphometric data based on larger samples, but these data and their analysis were never published.

Nevertheless, Casevitz-Weulersse provided some morphological features allegedly peculiar to her new taxon. She stressed the presence of semierect hairs on legs and scapes, lacking in *S. westwoodii*. I examined the

S. orousseti holotype worker, a paratype gyne, the paratype male and two non-paratype workers and discovered that these supposed semierect "hairs" on the appendages were actually the ordinary more or less raised pubescence (e.g. Fig. 71). This must be considered just as a matter of misapplied terminology, because in her description she stated that *S. orousseti* lacks pubescence on the appendages. Casevitz-Weulersse also maintained that *S. orousseti* differs from *S. striatulum* because of the larger size and presence of semierect hairs on the appendages in the former. Such a statement is vague and misleading, because of her misinterpretation of the pilosity (see also "Variable versus consistent morphological features" section, above). She also failed to include any stronger characters that would help separate *orousseti* from *striatulum* workers. Casevitz-Weulersse also included a comparison between gynes and males of all three species and most of her arguments were based on the intermediate size of *S. orousseti*; but the size of *orousseti* gynes actually falls within the range of *striatulum*. She reported an apparently stronger character in the male: the elongation of the second funicular segment (see below). At the end of her comparisons Casevitz-Weulersse stated that *S. orousseti* is intermediate between *S. westwoodii* and *S. striatulum*, and that the presence of semierect hairs on the appendages put her new species close to *S. petiolatum*!

It is now obvious that Casevitz-Weulersse's comparison with *S. petiolatum* is wrong because, besides several unmentioned diagnostic features, *petiolatum* bears two kinds of pilosity: ordinary pubescence and sparse standing hairs.

The paratype gyne I examined is an ordinary *S. striatulum* in size, sculpture and morphology, and my measurements also lead to this conclusion (see under *S. striatulum*).

The *S. orousseti* paratype male is an ordinary *S. debile*, as characterised by its reduced mandibles; but Casevitz-Weulersse pointed out the peculiar elongation of the second funicular segment. I compared it with males from different Italian localities and found some variations in this character, with some specimens showing the same condition as in the *S. orousseti* male. Also, the *S. orousseti* male is said to have the second funicular segment twice as long as the third, but my measurements show a ratio of approximately 1.4. Therefore, for reproductives, there is insufficient evidence to delimit *S. orousseti* as a new species.

Stenamma orousseti workers (Figs. 9, 17) are a little more puzzling. Their size falls within the upper range of *S. striatulum* and the lower range of *S. debile*, yet all main features including indices, sculpture, waist structure and propodeal spines are as in *S. debile*. As a result, I failed to find any distinctive character that allowed me to consider *S. orousseti* as a distinct species.

Casevitz-Weulersse reported that workers were collected by Orousset together with queens by means of Berlese-Tullgren funnels; but that does not mean they were true nestmates. For instance, I came across some *Stenamma* samples collected by means of soil sifting and from the very same site where *S. debile* specimens co-occurred with *S. striatulum* ones. In addition, although Casevitz-Weulersse (1990) and DuBois (1998) reported *orousseti* workers having a head sculpture as in *S. striatulum*, the specimens that I examined look indistinguishable from *debile*: they have a longitudinal wandering rugulation with many anastomoses and quite distinct ground sculpture, giving to the head surface a subopaque and areolate pattern (Fig. 17). Also, Casevitz-Weulersse used "Buschinger's index" (see PSI under "Measurements and indices") as a value of relative propodeal spine length in order to strengthen her comparison. She reported *orousseti* ranging from 1.7 to 2.3 and a mean of 1.97 for 21 workers. I calculated this index for the holotype and two further workers that she had already examined. My results are much lower: 1.5 to 1.6 and strongly below the range reported by the author. A comparison among SEM photographs of workers' profiles of *debile* (Figs. 2, 8), *orousseti* (Fig. 9) and *striatulum* (Fig. 12) shows how propodeal spines in the *orousseti* holotype are similar to those of *debile*; but even drawings in the original paper already suggested such a conclusion.

My last argument for the invalidity of *S. orousseti* comes from the fact that DuBois borrowed several Italian *Stenamma* specimens from my collection and later he returned a single specimen from Sardinia labelled as *S. orousseti* (although doubtfully so in DuBois' own words). On comparing this specimen with other material from Sardinia I concluded that it definitely belongs to *S. sardoum* on the basis of the shape of the waist, ferrugineous colour and promesonotal sculpture.

In conclusion, I propose *S. orousseti* Casevitz-Weulersse as a junior synonym of *S. debile* **syn. n.** The paratype male of *S. orousseti* also belongs to that species, but probably all gynes originally assigned to *S. orousseti* must be referred to *S. striatulum*.

Material examined

SPAIN. Andalucia: Sierra del Niño (Algeciras, Cadiz), 180 m, 26.iii.1987, *Quercus suber* forest (*S. Zoia*); Montejaque env. (Ronda, Malaga), 650 m, 24.iii.1987, oak leaf litter (*S. Zoia*); Bujaraiza env. (Cazorla, Jaén), 640 m, 31.iii.1987, *Quercus ilex* leaf litter (*S. Zoia*).

UNITED KINGDOM. London, 29.xi.1952 (*J. Simonet*).

FRANCE. SW Corse: W of Cagnocoli, 460 m, 19.iv.1992, *Fagus sylvatica* leaf litter (*S. Zoia*); N env. Sartène, 19.iv.1992, 280 m, *Quercus ilex* leaf litter (*S. Zoia*); Matra, W of Alistro, x.1984 (*J. Orousset*); Île de France, Conches, 22.xii.1951 (*J. Simonet*).

NETHERLANDS. Amerongen (Utrecht) (*Mabelis*).

SWITZERLAND. Canton Ticino: Lavorgo Leventina, 650 m (*A. Focarile*); Valais: Dorénaz, 7.vii.1967 "pied vieille souche" (*C. Besuchet*). Genève: Pic Grave, 400 m, 1.xi.1947 (*A. Comellini*); Verbois, 9.vii.1961 (*J. Simonet*).

ITALY. Piemonte: Val Pesio (Cuneo), viii.1907 (*R. Gestro*); Barge (Cuneo), Giala loc., Comba Linsolero, 700 m, 13.iii.1992 (*G.B. Delmastro*); Demonte (Cuneo), Vallone dell'Arma, San Maurizio, 1150 m, 20.iii.1992 (*G.B. Delmastro*); Carmagnola (Torino), grove nr. Cascina Cascaudo, 260 m, 19.xi.1991 (*G.B. Delmastro*). Liguria: Val Bisagno (Genova), iii.1978, meadow (*S. Zoia*); San Colombano Certenoli (Genova), 13.iii.1978 (*G. Gardini*); Genova env., 10.iii.1978, meadow (*S. Zoia*). Lombardia: Mt. San Primo (Como) v.1985 (*R. Sciaky*); Galbiate, Mt. Barro, Val Faé (Lecco), 620 m, 17.v.1990

(*R. Regalin*); SW env. of Ballabio (Lecco), 550 m, 29.i.1994 (*S. Zoia*); Valgreghentino (Lecco), Val Tolsera, 30.iii.1991 (*R. Regalin*); Valgreghentino (Lecco), 720 m, 22.iv.1989 (*R. Regalin*); Sonico, Comparte env. (Brescia), 850 m, 6.iii.1994 (*S. Zoia*); Bosco Fontana Natural Reserve, Marmirolo (Mantova), 15.i.1956 & 15.xii.1957 (*B. Poldi*). Trentino Alto Adige: Cavareno (Trento), 1000 m, 31.vii.1966 (*B. Poldi*). Friuli Venezia Giulia: Venzone (Udine), Mt. Plauris, nr. Casera Ungarina, 1325 m, 1-30.ix.2006, *Fagus sylvatica* forest (*G. Colombetta*); Cividale del Friuli, Codromaz (Udine), 500 m, 30.v.1986 forest with *Fagus sylvatica* (*C. Torti*); Lipizza (Trieste); Lago Percedol (Trieste), 24.xii.1981, soil sifting (*M. Seriani*). Emilia Romagna: Travo (Piacenza); Mt. Fumaiolo (Forlì-Cesena), 3.viii.1982 (*I. Gudenzi*). Toscana: Pergine Valdarno (Arezzo), xi-xii.1910 & x.1912 (*A. Andreini*); Chiusi della Verna (Arezzo), ix.1953 & 15.xi.1953 (*B. Poldi*); Sestino (Arezzo), 10.xi.1953, base of an oak (*B. Poldi*); Moncioni, nr. Montevarchi (Arezzo), 28.xi.1953 (*B. Poldi*); Alpe della Luna, nr. Viamaggio (Arezzo), 920 m, 27.vi.1986, beech+oak (*S. Zoia*); Vallombrosa (Firenze), 1150 m, 28.vi.1986 (*S. Zoia*); Arcidosso (Grosseto), vii.1908 (*F. Solari*); Giannutri Island (Grosseto) (*Gruppo Entomologico Ligure*); Mt. Amiata (Grosseto), vii.1986 (*R. Sciaky*); La Verna (Arezzo), 1120 m 26.v.1986 (*S. Zoia*); Mt. Argentario (Grosseto), NE macchia above the Noviziato, 400 m ca., 22.iii.1921 from sifting of leaves and roots (*Moczarsky-Scheerpeltz*) [translated from German]; Parco Naturale della Maremma, Uccellina, Alberese (Grosseto), 2.vi.1988 (*P. Cenzi*); Isola d'Elba (Livorno), Poggio, 6.i.1963, moss (*Villa Bianchi*); Isola d'Elba (Livorno), Villa di Napoleone, 23.xii.1975, soil sifting in *Quercus ilex* wood (*G. Gardini*); Isola d'Elba (Livorno), S env. of Marciana, 350 m, 42°47'N – 10°10'E, 5.xii.1999 (*S. Zoia & F. Polese*); Colognole (Livorno), 150 m, 17.x-2.xi.2006, malaise trap (*F. Iaccarino & F. Bongianni*). Umbria: Lippiano (Perugia), 1.xi.1936 (*A. Andreini*); Costacciaro, Mt. Cucco (Perugia), 1100 m, 23.iv.1989 (*S. Zoia*). Lazio: Filettino (Frosinone), 3.v.1911 (*A. Dodero*); Fiuggi (Frosinone), 3.ix.1958 (*B. Poldi*); Abruzzo: Rosello (Chieti), 27.viii-9.ix.2005, malaise trap (*D. Birtele & P. Cerretti*). Basilicata: nr. Lagonegro (Potenza), iv.1909 (*Andreini*); Mt. Pollino (Potenza), Colle dell'Impiso, 1500 m ca., 1.vi.1990, *Fagus sylvatica* forest (*R. Regalin*); Accettura (Matera), forest Gallipoli, 950 m, 9.vi.1989, oak forest (*F. Angelini*). Calabria: Mt. Pollino (Cosenza), S slope of Coppola di Paola, 1440 m, 12.vi.1991 (*S. Zoia*); Sila Piccola, E slope Mt. Pietra Posta (Catanzaro), 1400 m, 12.vi.1991, *Fagus sylvatica* forest (*S. Zoia*); Morano Calabro (Caserta), Convento Colloreto, 4-7.v.2004 (*S. Zoia*); Aspromonte Natl. Pk., Gambarie (Reggio Calabria), Punta Scirocco, 1500 m, 21.x.1966 (*G. Osella*); Giffone (Reggio Calabria), Piano della Limina, 1100 m, 28.ix-12.x.2004, malaise trap (*Grasso & Mauro*). Puglia: Acquaviva delle Fonti (Bari), 16.x.1988 (*L. De Marzo*). Sicilia: Mt. Etna (Catania), Mt. Rosso, 1756 m, 10.x.1992; Enna, 1993 (*S. Platania*); Madonie Mts., Collesano (Palermo), Piano Zucchi, 1050 m, 31.v.1985 (*S. Zoia*); Castelbuono (Palermo), NE slope Pizzo Carbonara, 1400 m, 31.v.1985 (*S. Zoia & R. Rizzerio*); Bosco della Ficuzza (Palermo), Torretta Torre, 940 m, 5-23.v.2004, i-ii.2005 & x.2005, pitfall & malaise traps (*Birtele, Cerretti, Nardi, Whitmore & A. Gatto*). Sardegna: Lula (Nuoro), 7.iii.1912 (*A. Dodero*); Padru Mannu, Macomer (Nuoro), 22.v.1976 (*G. Osella*); Iglesiente, Marganai Mts. (Carbonia-Iglesias), 700 m, 29.ix-21.x.2003, malaise trap (*D. Birtele, P. Cerretti, E. Minari, M. Tisato & D. Whitmore*); Is. Tavolara (Olbia-Tempio), 21.ii.1966, under stones nr. Grotta degli Aranci (*CNR*); Iglesias, loc. Mamenga (Carbonia-Iglesias), 610 m, 1.iii.2006, soil sifting (*L. Fancello*).

CZECH REPUBLIC. Bohemia: Liteň, 1.v.1975 (*P. Werner*).

SLOVAKIA. NW env. of Pezinok (Bratislava), 400 m, 14.viii.1992 (*S. Zoia*).

SLOVENIA. Mt. Snežnik,23.x.1983, mosses (*M. Seriani*); slope of V. Javenik, E of Postojna, 590 m, 45°46'59" N – 14°18'25" E, 8.viii.2007, mixed wood beech+fir (*S. Zoia*).

CROATIA. Istria: Mt. Maggiore [Učka] (*Winkler*).

GREECE. Ionian Islands: Kefalonia, Plagiá, 350 m, 10.iv.1993 (*M. Pavesi*); Kefalonia, 8 km SW of Sami, Mt. Strongilos, 350 m, 13.iv.1993 (*M. Pavesi*). Epirus: Kalivia,W of Mt. Timfi (Ioánnina), 650 m, 28.v.1989, *Quercus ilex* forest (*S. Zoia*). Thessalia: S slope of Mt. Pílion (Vólos), 900 m, 24.v.1989 (*S. Zoia*); NW slope of Mt. Ossa, 1000 m, 25.v.1989 (*S. Zoia*). Macedonia: W of Kastania (Naousa), 1020 m, 27.v.1989 (*S. Zoia*).

TURKEY. N of Kamerköy (Antalya), 800 m ca., road 7-52, 11.iv.1993, oak's rotting stump (*S. Vit*).

Known distribution. Widespread and common in West Europe; also recorded in East Europe (including West Russia) and in Turkey.

Comment. *Stenamma debile* is the most widespread European *Stenamma* species and I examined specimens from Spain to Turkey. It may be confused with *S. westwoodii*, *S. sardoum* and *S. striatulum* (see under these species for further details). Some variation occurs especially in colour, although *S. debile* is usually darker than most species dealt with in this paper.

A series of workers from Spain (Bujaraiza env.) have pronotal sides and mesopleuron mostly strongly reticulate-punctate and almost devoid of usual rugulae. Also, their promesonotal dorsum is more roughly sculptured with a more reticulate rugosity; but remaining characters and measurements (except for their average slightly larger size) are characteristic of *S. debile*. Other Spanish specimens (Montejaque env.) appear intermediate in sculpture between those and ordinary *debile*. Another series from Mt. Etna (Sicily) has the promesonotal sculpture more irregularly arranged than usual, approaching the condition of *sardoum* or *africanum*.

Among the characters provided by DuBois (1993: 299-300) in order to distinguish *S. debile* from *S. westwoodii*, I briefly consider here (and not later in this paper): the shape of the petiole seen from above, the shape of frontal lobes (indicated as frontal carinae by DuBois) and the position of propodeal spines seen from above. I found that on the basis of the material I examined, *S. debile* has a petiole in dorsal view that appears shorter and with more anteriorly converging sides (the distance between the anterior slightly protruding spiracles is about 2/3 of the width at the node level) than in *S. westwoodii* (where the ratio is higher, about ¾, and this ratio is shared with the other species discussed below). However, DuBois' text and fig-

ures (1993) concerning this feature seem to be inverted between his morpho-types "A" and "B". The propodeal spines seen from above (that is with the mesosoma slightly-tilted backward) appear more distant and divergent in the female castes of *S. debile* (and also in *S. striatulum*) than in other taxa. In the former the distance between propodeal spines' tips is about 1/4 or more of HW, in other taxa it is around 1/5. Finally, the differences in the shape of the frontal lobes suggested by DuBois seem to me to be insignificant or hardly detectable (compare, for instance, Figs. 16 and 21).

Males of *S. debile* (Figs. 57, 61, 66) have distinctive mandibles because of their reduced dentition and short masticatory margin, appearing weakly developed when compared with those of males of other species. The number of teeth is usually reported as 3 (Kutter, 1971; DuBois, 1993); but, as in females, some variations occur and right and left mandibles may have different dentitions. Apical and preapical teeth are always well developed; but the 3rd and basalmost tooth may be reduced and nearly absent (a blunt angle at most) or even split into two minute denticles, providing a total dental count of 2 to 4.

Among the Sardinian material I found some *S. debile* males with ordinary 3-toothed mandibles and some with 4 or even 5 teeth. The latter specimens have a more developed masticatory margin, but even these mandibles are always reduced, especially when compared to those of males of most species with fully developed triangular mandibles. As all of them were collected together with several winged *S. debile* gynes and one of *S. sardoum*, I considered the possibility that some males with 4- or 5-toothed mandibles could belong to *S. sardoum*. However, I could not see any true gap between Sardinian males with ordinary 3- and those with 5-toothed mandibles. This variation seems partially due to the increasing development of the inner mandibular margin. It may be straight and about parallel with the outer border (so the mandible looks somewhat narrowly rectangular) or more or less convex, slightly diverging from the outer margin, and forming a hint of an angle or a denticle at the corner with the masticatory margin. Also, my measurements of *debile* males collected in Sicily and continental Italy show a relatively high variability in size and indices. So, through lack of sufficient comparative material, I refrain from giving a different name to Sardinian males with extra teeth on the mandibles. As males usually have quite strong external features useful to separate them at species level, I would expect the male of *S. sardoum* to have some more peculiar character combination. The only other male I saw with somewhat reduced mandibles is that of *S. striatulum* (see below).

Stenamma petiolatum Emery
(Figs. 3, 10, 18, 25, 32, 39, 45, 52)

Stenamma petiolatum Emery, 1897: 12, fig. Holotype gyne, ITALY: Lazio, Isola del Liri, 1896 (*Y. Emery*) (MSNG) [examined].

[N.B. the handwritten label of the holotype reads: *Isola del Liri 1896 Y. Emery*. Emery (1916) reports: Campania, Valle del Liri. Since 1927 "Isola del Liri" and "Valle del Liri" belong to the province of Frosinone of the region Lazio and not to Campania.]

Diagnostic features. It is an easily recognizable taxon because of its large size, slender body and appendages, and presence of standing hairs on legs and scapes in addition to the usual pubescence.

Measurements. Worker. TL 4.8–5.0; HL 1.03–1.10; HW 0.85–0.91; CI 83; SL 0.93–0.98; SI 108–109; PCI 31–33; PnW 0.60–0.67; AL 1.32–1.43; PSI 1.72–2.00; PeL 0.52–0.55; PPL 0.31–0.33; PeH 0.25; PPH 0.24–0.25; PeW 0.19–0.20; PPW 0.27; PI1 57–60; PI2 60–64; MTL 0.82–0.89; TI 96–98 (3 measured).

Holotype gyne. TL 5.4; HL 1.08; HW 0.88; CI 81; SL 0.97; SI 110; PCI 35; AL 1.58; PSI 2.00; ScW 0.76; MnL 1.15; PeL 0.59; PPL 0.36; PeH 0.27; PPH 0.27; PeW 0.20; PPW 0.28; PI1 61; PI2 67; MTL 0.93; TI 106.

Gyne. TL 5.7; HL 1.08; HW 0.93; CI 86; SL 1.00; SI 108; PCI 36; ScW 0.79; MnL 1.16; AL 1.57; PSI 1.76; PeL 0.59; PPL 0.35; PI1 59; PI2 63; PeH 0.27; PPH 0.27; PeW 0.22; PPW 0.29; MTL 0.93; TI 100 (1 measured).

Description. *Worker* (Figs. 3, 10, 18, 25, 32). Mandibles with 9-10 teeth and denticles. Eye with about 10 ommatidia. Scape long, slightly but distinctly surpassing the posterior margin of the head when laid back. Mesosoma, waist and legs slender. Sculpture mostly reticulate-rugose; a longitudinal pattern is present chiefly on the head and waist, Mesosoma, especially dorsally, areolate and with a trace of median carina on the pronotum. Propodeal spines moderately long and apically narrowly blunt. Pilosity mostly as in other European species; but scapes and tibiae also bear some scattered suberect hairs. Colour ferrugineous.

Gyne (Figs. 39, 45, 52). Main features as in worker except for the usual caste differences.

Male unknown (see under *S. zanoni*).

Material examined (besides holotype gyne)

ITALY. Liguria: Genova, xi.1901 (*E. Borgioli*). Toscana: Mt. Argentario (Grosseto) (*A. Dodero*) & 12.v.1907 (*F. Solari*).

Distribution. A very rarely collected species, whose occurrence has been ascertained for only a few scattered Italian localities. Records from Switzerland must be referred to *S. zanoni* n. sp. (see below). Maltese (Schembri & Collingwood, 1981), Spanish (Martínez & Acosta, 1985) and Corsican (Casevitz-Weulersse, 1990) records await confirmation (see below).

Comment. In my opinion the only genuine specimen of *petiolatum* that DuBois (1998) examined was the holotype gyne (which he labeled as "Lectotype", despite the fact that Emery (1897) had based his description on a single specimen); all other specimens he referred to *S. petiolatum* were misidentified. As can be seen from DuBois' descriptions of worker and gyne, there is at least one striking difference between the holotype and all the other material: he reported all workers and 2 gynes having SI < 100, and stated that the scape was: "almost reaching but not surpassing occipital vertex". However, the holotype gyne was reported with a SI = 109 (110 in my measurements) and "scape surpassing occipital vertex by an amount slightly greater than the length of first funicular segment". On the basis of the few specimens I examined

the worker and gyne are very similar, as is usual in *Stenamma*. Therefore, I would expect any genuine *S. petiolatum* female to have SI distinctly > 100 and with the scape surpassing the posterior margin of the head. DuBois also stated that Corsican workers looked different from those from Mt. Argentario, Italy. He borrowed the latter and two gynes (the only ones available, except for the holotype) from the Museum of Comparative Zoology (Harvard University, USA), but these specimens are reported as having a locality label identical to that of a series of *S. debile* in MSNM collection. These specimens were originally studied and determined by Finzi (1924), who presumably did not see any genuine *S. petiolatum* specimens, but merely inferred that it was a common species on Mt. Argentario, because Emery (1915) described *petiolatum* worker from that locality. I also tried to see the Corsican specimens mentioned in DuBois' paper. However, Xavier Espadaler, their owner, had lent the specimens to another specialist and could not retrieve them in time for this study.

Kutter (1971) and Della Santa (1988) reported *S. petiolatum* from the Swiss locality of "Canton Ticino", a southern region of Switzerland bordering on North Italy. Della Santa (1988) assigned a single worker to *S. petiolatum*, whose diagnostic features are quite different from what I would expect for *petiolatum*. I borrowed this worker and realized that it was indistinguishable from my new species *S. zanoni* n. sp. (see below). Kutter (1971) described an isolated male he assigned to *petiolatum*; but I am reasonably certain it also belongs to *S. zanoni*. In fact, Kutter's male comes from San Nazzaro, on the Swiss shores of Lake Maggiore, which is very close to the "small island" of Brissago, where Della Santa's worker originated. Consequently, I am confident that it is a male of *S. zanoni* (see below). *S. petiolatum* and *S. zanoni* are quite different, but share characters of relatively large size and the presence of some raised setae on scapes and tibiae. The occurrence of this feature in Kutter's male, as well as other distinctive characters different from those of other *Stenamma* males, led Kutter to assign his specimen to *S. petiolatum*.

Martínez & Acosta (1985) reported *S. petiolatum* from several Spanish localities, without any comment about either morphology or taxonomy. DuBois overlooked this paper and I was unable to see any Spanish specimen. Xavier Espadaler (pers. comm.) has not see any Spanish specimen certainly referable to *petiolatum* and he is strongly uncertain about the reliability of the authors' identifications because *Stenamma* was poorly known at that time.

Finally, because of lack of reliable data, at present I consider *S. petiolatum* as a rarely collected Italian endemic.

Stenamma sardoum Emery
(Figs. 4, 11, 19, 26, 33, 40, 46, 53)

Stenamma sardoum Emery, 1915: 255, pl. IV, figs. 5, 6. Lectotype worker, paralectotype workers and gyne, ITALY: Sardinia, Aritzo, xi.1911 (*D. Dodero*) (MSNG) [examined].

Diagnostic features. This species has no unique strong diagnostic features, but, besides its distribution, it is recognisable by the following combination of worker characters: the values of SI (usually ≥ 90) and PCI (range: 25–34) plus relatively low and elongate postpetiole (Fig. 26) and irregular promesonotal sculpturation (Fig. 33). The gyne (Figs. 40, 46, 53) is similar, except for the sculpturation.

Measurements. Lectotype worker (designated by DuBois (1998)): TL 3.6; HL 0.87; HW 0.72; CI 83; SL 0.66; SI 92; PnW 0.48; AL 1.00; PeL 0.38; PPL 0.26; PeH 0.20; PPH 0.21; PeW 0.16; PPW 0.21; PI1 68; PI2 53; MTL 0.61; TI 85.

Paralectotype workers: TL 3.6–3.9; HL 0.86–0.91; HW 0.72–0.77; CI 84–85; SL 0.67–0.70; SI 89–93; PnW 0.48–0.51; AL 1.04–1.10; PeL 0.38–0.42; PPL 0.26–0.29; PeH 0.20–0.23; PPH 0.21–0.23; PeW 0.15–0.18; PPW 0.20–0.23; PI1 68–69; PI2 53–55; MTL 0.61–0.65; TI 84–86 (3 measured)

Paralectotype gyne: TL 4.5; HL 0.95; HW 0.82; CI 86; SL 0.74; SI 90; ScW 0.64; MnL 1.01; PeL 0.48; PPL 0.33; PeH 0.25; PPH 0.26; PeW 0.20; PPW 0.28; PI1 69; PI2 59; MTL 0.72; TI 88.

Non-type material:

Worker. TL 3.3–4.3; HL 0.81–0.91; HW 0.67–0.76; CI 82–85; SL 0.63–0.70; SI 89–96; PCI 25–34; PnW 0.43–0.51; AL 0.95–1.11; PSI 1.58–1.88; PeL 0.37–0.42; PPL 0.23–0.27; PeH 0.19–0.22; PPH 0.18–0.22; PeW 0.15–0.17; PPW 0.19–0.23; PI1 62–69; PI2 51–57; MTL 0.56–0.65; TI 81–89 (17 measured).

Gyne. TL 4.4–5.0; HL 0.92–1.01; HW 0.79–0.85; CI 84–86; SL 0.71–0.76; SI 89–90; PCI 30–34; AL 1.28–1.40; PSI 1.60–2.10; ScW 0.64–0.68; MnL 0.92–1.01; PeL 0.47–0.50; PPL 0.31–0.33; PeH 0.25; PPH 0.24–0.26; PeW 0.20–0.21; PPW 0.26–0.28; PI1 66; PI2 59; MTL 0.66–0.73; TI 84–86 (2 measured).

Male unknown (but see under *S. debile*).

Material examined

ITALY. Sardegna: Aritzo [Nuoro], xi.1911 (*D. Dodero*) **[type series]**; Villagrande Strisaili (Ogliastra), iv.1987 (*Torti*); Mt. Sant'Antonio (Nuoro), 9.xii.92 (*R. Sciaky*); E of Seui (Ogliastra), 850 m, 15.v.1994, *Quercus ilex* leaf litter (*S. Zoia*); Iglesias, loc. Mamenga (Carbonia-Iglesias), 610 m, 1.iii.2006, soil sifting (*L. Fancello*); Iglesias, nr. Case Marganai (Carbonia-Iglesias), 660 m, 14.xi.2006, soil sifting (*M. Bardiani, G. Nardi, M. Zapparoli & D. Whitmore*); Marganai Mts. (Carbonia-Iglesias), 700 m, 21.x-17.xi.2003, malaise trap (*Birtele, Cerretti, Minari, Tisato & Whitmore*).

Distribution. Seemingly a relatively common Sardinian endemic. X. Espadaler (pers. comm.) has assigned the single specimen reported from Spain by Collingwood and Yarrow (1969) to *S. debile*.

Comment. Emery (1915) described *Stenamma sardoum* on the basis of a few workers and one gyne, comparing it with *S. westwoodii* of earlier authors (i.e. specimens now known to be *Stenamma debile*) and pointed out the strong difference in the shape of the petiolar node that he described as truncate in profile. Actually, Emery was quite wrong in reporting such a feature, even adding a misleading figure. I examined the type series and several other specimens of *S. sardoum* and all of them have an ordinary, somewhat rounded node in profile with a faint

flattening at most (Fig. 26). DuBois (1998) designated the lectotype and redescribed *S. sardoum.* In his keys he stated that the petiolar node was "depressed". Nevertheless his drawings showed a petiolar profile comparable to that of most *Stenamma*.

At a glance *sardoum* female castes were easily separated from co-occurring specimens of *debile* because females of *sardoum* are mostly ferrugineous, distinctly paler than the brown *debile*, even though colour differences are generally considered unreliable. Also, in *sardoum* petiolar and postpetiolar sternites in profile look distinctly, although weakly, more concave below the nodes. In contrast, the waist sternites of *debile* are only faintly concave at most (compare Figs. 24 and 26). This difference is easier to appreciate when specimens of both species are compared directly. *Stenamma sardoum* female castes generally look similar to *S. westwoodii*. Diagnostic features useful to separate them are difficult to appreciate and rely on difference in PCI, promesonotal sculpturation and shape of postpetiole.

Stenamma siculum n. sp.

(Figs. 5, 41, 47, 48, 54, 58, 63, 68)

Diagnostic features. A relatively slender species with moderately elongate scape. The male has fully developed mandibles and reticulate-punctate propodeal dorsum (Fig. 68). Both gyne and male bear several standing (subdecumbent to suberect) hairs along the dorsal edge of the scape mixed with the ordinary subdecumbent pubescence (Fig. 48).

Measurements. Holotype (Gyne) TL 4.8; HL 0.95; HW 0.78; CI 82; SL 0.77; SI 99; PCI 35; AL 1.40; PSI 1.64; ScW 0.67; MnL 1.05; PeL 0.51; PPL 0.30; PeH 0.24; PPH 0.24; PeW 0.20; PPW 0.26; PI1 59; PI2 65; MTL 0.73; TI 94.

Gyne. TL 4.6–5.1; HL 0.94–1.02; HW 0.77–0.84; CI 82–84; SL 0.77–0.82; SI 97–100; PCI 29–33; AL 1.32–1.50; PSI 1.5–1.8; ScW 0.66–0.74; MnL 0.95–1.11; PeL 0.49–0.54; PPL 0.30–0.34; PeH 0.24–0.27; PPH 0.23–0.26; PeW 0.18–0.21; PPW 0.24–0.28; PI1 59–68; PI2 62–66; MTL 0.72–0.79; TI 90–96 (11 measured).

Male. TL 3.4–4.5; HL 0.65–0.73; HW 0.54–0.62; CI 82–85; SL 0.29–0.36; SI 53–64; AL 1.19–1.43; ScW 0.58–0.71; MnL 0.79–0.97; PeL 0.44–0.50; PPL 0.24–0.27; PeH 0.17–0.22; PPH 0.18–0.21; PeW 0.16–0.19; PPW 0.21–0.26; PI1 54–59; PI2 78–82; MTL 0.82–0.99; TI 151–163 (6 measured).

Description. Worker unknown.

Gyne (Figs. 5, 41, 47, 48, 54). Mandibles longitudinally rugose with distinct piligerous pits, 8-10 toothed. Anterior clypeal border shallowly concave in the middle. Head (Fig. 47) distinctly longer than wide, with moderately convex sides, narrower at occipital angles than at mandibular insertion; its surface mostly areolate with longitudinal rugulation prevailing on the front, reticulate-punctate ground sculpture moderately developed. Scape moderately long, usually just reaching the posterior margin of the head when laid back. The latter weakly convex in full face view.

Mesosoma (Fig. 41, 54) in profile with weakly convex mesoscutum; propodeal dorsum steep. Pronotum mostly transversely irregularly rugose. Mesonotum with an irregular median carina and mostly longitudinally irregularly rugose. Sides of mesosoma irregularly longitudinally rugose, except for the largely smooth anterior mesopleuron. Propodeal dorsum transversely rugose; its declivity faintly transversely rugulose and shining. Propodeal spines strong and sharp. Waist reticulate-punctate with scattered short irregular rugulae; nodes mostly smooth and shining. Petiole in profile with a bluntly triangular node, its sternite distinctly concave at node level and with no anterior subpetiolar process. Postpetiole in profile relatively elongate; its sternite weakly concave and with a slightly protruding anterior process. In dorsal view petiolar peduncle just behind the protruding spiracles about parallel-sided. Gaster almost completely smooth and shining, except at its basalmost portion, which is weakly reticulate-punctate with superimposed diverging short rugulae.

Appressed to subdecumbent pubescence moderately long and occurring above most surfaces, more abundant on head and appendages. Standing, subdecumbent to erect, hairs as usual: abundant on head (especially dorsomedially, laterally and ventrally), dorsum of mesosoma and gaster. Scape (Fig. 48) dorsally with several standing (subdecumbent to suberect) hairs raised above the level of the pubescence; extensor surface of mid and hind tibiae with few, sparse subdecumbent setae besides the ordinary decumbent pubescence. All of these appendage setae often are not clearly distinguishable from pubescence hairlets, but they are basally straighter and raised above pubescence level.

Colour mostly ferrugineous throughout, with a more testaceous gaster. Wings appearing faintly infuscated

Male (Figs. 58, 63, 68). Mandibles fully developed, superficially rugulose and shining, 6- to 7-toothed. Head (Fig. 63) in full face view with moderately convex sides; mostly finely reticulate-punctate, with superimposed, chiefly longitudinal, rugulae. Pronotum mostly superficially reticulate-punctate with scattered rugulae. Mesoscutum mostly smooth and shining, especially anteriorly between the well marked notauli; the remaining portions irregularly reticulate-rugose. Scutellum strongly sculptured, reticulate-punctate with irregular rugosity. Propodeal dorsum with a similar, but more superficial sculpturation. Mesosoma in profile with prevailingly smooth mesopleuron and rugose propodeum. The propodeal dorsum distinctly longer than the declivity, which is finely transversely rugulose and shining. Waist chiefly reticulate-punctate, longitudinally rugulose, with smooth nodes.

Pilosity mostly as in gyne.

Colour mostly piceous, with brown appendages and paler mandibles, tarsi and apical half of the funiculi. Wings as in gyne.

Holotype (gyne): ITALY, Sicily, Corleone (Palermo), fraz. Ficuzza, 680 m, UTM 33 S 357272 4194090, 9.xii.2003-24.II.2004, malaise trap (*D. Birtele, P. Cerretti, M. Tisato*). (CNBF)

Paratypes. 21 gynes and 5 males with the same data as the holotype. 10 gynes and 4 males: ITALY, Sicily, Bosco della Ficuzza (Palermo), Torretta Torre, 940 m, UTM 33 S 357671 4194110, malaise trap I-II.2005, (*A. Gatto*). 1 male: ITALY, Sicily, Bosco della Ficuzza (Palermo), Torretta Torre, 940 m, Plot Conecofor SIC 1, UTM 33 S 357671 4194110, malaise trap ix.2005 (*A. Gatto*). (BMNH, CNBF, MSNG, MSNM)

Comment. Initially I was unaware of this new species and thought these specimens could belong either to *S. sardoum* or to *S. msilanum* (*sensu* DuBois, 1998; see below). In fact, they seem to share many features with both, especially relatively elongate appendages and shape of the petiole. The unique striking difference from them is the presence of several raised hairs on the appendages (e.g. Fig. 48). This feature is shared with very different taxa such as *S. petiolatum* and *S. zanoni* (e.g. Fig. 72). Unfortunately, the worker is still unknown, but I am confident it will exhibit the same distinctive feature.

Stenamma striatulum Emery
(Figs. 6, 12, 20, 27, 34, 42, 49, 55, 59, 64, 69)

Stenamma westwoodi var. *striatulum* Emery, 1895: 300 (footnote). 2 syntype workers and 1 dealate gyne, ITALY: Capodimonte [Naples], 30.iii.[18]72 (*C. Emery*) [not examined]. 1 syntype alate gyne, ITALY: Piemonte "776" [handwritten by Gribodo] (*Gribodo*) (MSNG) [not examined].

Stenamma striatulum Emery. Müller, 1923: 46. [Raised to species].

Stenamma westwoodi var. *tscherkessikum* Arnol'di, 1928: 214, figs. 5-6. Holotype gyne, RUSSIA: NE coast of the Black Sea, Abrau nr. Novorossiysk, 28.viii.1924 (*Arnol'di*) (ZMMU) [not examined]. [Synonymy by Arnol'di, 1975: 1822].

Diagnostic features. This is the smallest (especially the gyne) West European *Stenamma*, characterised, in both the female castes and the male, by finer and more longitudinally arranged rugulation on head (especially on frons and vertex, see Figs. 20 and 49) and promesonotum (Figs. 34, 55); the integument in females looks also somewhat shinier than in other species. Furthermore, the worker has moderately long propodeal spines (PSI nearly always > 1.6 and sometimes even > 2.00), and both female castes have scapes almost reaching the posterior margin of the head when laid back. The waist appears somewhat stocky and with petiolar sternite straight and postpetiolar sternite shorter than usual (Fig. 27). Males have relatively weakly developed mandibles (Fig. 64) and a peculiar propodeal dorsum sculpturation: strongly finely reticulate-punctate with several transverse rugulae (Fig. 69).

Measurements. Worker. TL 2.9–3.4; HL 0.67–0.78; HW 0.57–0.67; CI 83–89; SL 0.53–0.62; SI 89–97; PCI 26–34; PnW 0.38–0.46; AL 0.77–0.97; PSI 1.59–2.00; PeL 0.28–0.35; PPL 0.18–0.21; PeH 0.18–0.22; PPH 0.18–0.23; PeW 0.14–0.17; PPW 0.19–0.23; PI1 57–67; PI2 46–55; MTL 0.43–0.52; TI 73–81 (24 measured).

Gyne. TL 3.5–3.8; HL 0.75–0.80; HW 0.65–0.71; CI 85–90; SL 0.59–0.62; SI 86–91; PCI 24–32; AL 1.02–1.11; PSI 1.61–2.08; ScW 0.52–0.56; MnL 0.70–0.79; PeL 0.32–0.37; PPL 0.20–0.23; PeH 0.23–0.25; PPH 0.24–0.25; PeW 0.16–0.19; PPW 0.23–0.27; PI1 58–66; PI2 49–54; MTL 0.50–0.57; TI 77–82 (9 measured). [Measurements of a paratype gyne of *S. orousseti* for comparative purposes: TL 3.8; HL 0.79; HW 0.68; CI 86; SL 0.61; SI 90; AL 1.08; PSI 2.14; ScW 0.52; MnL 0.77; PeL 0.38; PPL 0.23; PeH 0.25; PPH 0.25; PeW 0.20; PPW 0.25; PI1 61; PI2 54; MTL 0.52; TI 76]

Male. TL 3.1–3.4; HL 0.55–0.56; HW 0.47–0.48; CI 85–86; SL 0.17–0.20; SI 36–42; AL 1.05–1.12; ScW 0.50–0.54; MnL 0.74–0.77; PeL 0.31–0.34; PPL 0.19–0.20; PeH 0.20–0.21; PPH 0.19–0.20; PeW 0.16–0.17; PPW 0.21–0.23; PI1 59–62; PI2 66–71; MTL 0.60–0.64; TI 128–133 (3 measured).

Material examined

SPAIN. Catalunya: Montseny (Barcelona), 12.x.1977 (*Briganti, Parodi & Zoia*); Sierra del Montseny, San Bernat, 800 m, 23.ix.1989 (*R. Poggi*).

SWITZERLAND. Canton Ticino: Claro (Bellinzona), 19.iii.1960 (*B. Poldi*); Sementina, 500 m (*A. Focarile*); Chiasso, 2.vi.1969, lavage de terre (*Besuchet-Löbl*); Rancate, 5.vi.1969, lavage de terre (*Besuchet-Löbl*); Cavergno, Valle Maggia, 600-800 m, x.1997 (*A. Focarile*); Ascona, 5.xi.1984, pied platane (*C. Besuchet*); Besazio, 7.xi.1984, feuilles mortes (*C. Besuchet*), Brissago, 4.xi.1984, herbes mortes & 26.iv.1985, vieille souche (*E. della Santa*); petite île de Brissago, pied mur église, 17-24.iv.1986 (*E. Della Santa*); petite île de Brissago, 14-21.vi.1986 & 12-19.vii.1986 (*E. Della Santa*).

ITALY. Piemonte: Arona (Novara), ix.1987 (R. Sciaky); Nebbiuno env. (Novara), 31.vii.1996, (*F. Rigato*); Lombardore (Torino), 13.iv.1964 (*G. Osella*); La Mandria Reg. Pk. (Torino), 17.vi.1985 (*E. Tosti-Croce*); NE env. Frossasco (Torino), 325 m, 9.x.1991 (*G.B. Delmastro & G. Poidomani*); Mt. Capretto Reg. Pk., Avigliana (Torino), loc. Pietra Piatta, 440 m, 22.x.1991(*G.B. Delmastro & V. Mangini*). Liguria: Leivi (Genova), xii.1898 (*Solari*); Nostra Signora di Montallegro, Rapallo (Genova), 16.vi.1907 (*Solari*); Mt. Fasce (Genova), 6.xi.1909 (*A. Dodero*); Casella (Genova), ix.1936 (*C. Mancini*); San Colombano Certenoli (Genova), 13.iii.1978 (*Gardini & Zoia*). Lombardia: Paderno d'Adda (Lecco), 220 m, 19.iii.1991 (*R. Regalin*); Monza park (Monza-Brianza), ix.1985 (*R. Sciaky*); Brughiera Briantea, Meda (Monza-Brianza), 23.i.2000 (*M. Plumari*); Valle di Astino (Bergamo), 280 m, 28.i.1982 (*Valle*); Bosco Fontana, Marmirolo (Mantova), 20.xi.1956 & 15.xii.1957 (*B. Poldi*); Soave - Rio Freddo (Mantova), 15.xii.1984 (*Cornacchia*). Veneto: Colli Euganei (Padova), 22.v.1931 (*Tasso, Schatzmayr & Koch*); Zovencedo, Monti Berici (Vicenza), 8.iii.1982 (*M. Seriani*); Riese Pio X (Treviso), 9-30.ix.1991 (*Schirato*); Bosco Olmé, Cessalto (Treviso), 7.iv & 26.ix.1980 (*Paoletti*); Bosco di Lison (Venezia), 21.ix.1986 (*Favretto*). Friuli Venezia Giulia: Bosco Sacile, Carlino (Udine), 26.ix & 2.xii.1980 (*Paoletti*); Cividale del Friuli, Codromaz (Udine), 500 m, 30.v.1986 forest with *Fagus sylvatica* (*C. Torti*); Cervignano del Friuli (Udine), 23.viii.1986 (*M. Seriani*); Duino (Trieste), 30.iii.1931 (*A. Schatzmayr*). Toscana: Alpi Apuane, Stazzema (Lucca), 20-22.vi.1921 (*A. Baliani*). Marche: Mt. Carda (Pesaro-Urbino), 18.xi.1938 (*A. Andreini*). Umbria: Lippiano (Perugia), vii.1930 (*A. Andreini*).

GREECE. Epirus: Pindos Mts., W of Mt. Athamanon [=Tzoumerka] (Arta), 920 m, 31.v.1989 (*S. Zoia*); Kalivia,W of Mt. Timfi (Ioánnina), 650 m, 28.v.1994 (*S. Zoia*). Thessalia: S slope of Mt. Pílion (Vólos), 900 m, 24.v.1989 (*S. Zoia*).

TURKEY. Borçka (Artvin), 15.vi.1969 (*G. Osella*); Dereli (Giresun), 800 m, 7.vii.1975 (*G. Osella*); Bulancak (Giresun), 7.vii.1975 (*G. Osella*).

Distribution. Widespread and locally common in South Europe from Spain to Greece, and also occurring in Anatolia.

Comment. A quite distinctive species because of its small size, more regular longitudinal sculpturation, propodeal spines length and waist structure. The workers may be superficially confused with small specimens of *S. debile* (see discussion of *S. orousseti* above).

After the examination of dozens of *S. striatulum* workers, I discovered that in profile the short, shallow, somewhat rectangular prominence of the postpetiolar sternite in *S. striatulum* is about 40% of PPH; whereas the same structure in other species is >50% of PPH (for instance, compare Figs. 24 and 27). This feature seems consistent and allows the recognition of *S. striatulum* female castes at a glance.

As mentioned above I examined a paratype gyne of "*S. orousseti*", which is indistinguishable from those of *S. striatulum*. In my opinion, because of their size (as reported in the original description) all of "*S. orousseti*" gynes should be referred to *S. striatulum*.

Males of *S. striatulum* are easily recognizable by their combination of strongly sculptured propodeal dorsum (Fig. 69) and slightly reduced 4- to 5-toothed mandibles (Fig. 64), and by their low SI (< 45) and TI (< 135).

Stenamma westwoodii Westwood
(Figs. 13, 21, 28, 35, 43, 50, 56, 60, 65, 70)

Stenamma westwoodii Westwood, 1839: 219, fig. 86. Lectotype male, UNITED KINGDOM (OUMNH) [not examined].

Diagnostic features. A species with moderately elongate scapes and legs, recognizable in female castes especially by its slightly constricted posterior clypeal lobe (Figs. 21, 50), whose minimum width is about 1/5 to almost 1/4 of the maximum distance between the frontal lobes. Also, worker's promesonotum (Fig. 35) has a well defined, but wandering, median carina, which is crossed by short irregular transverse rugulae. The male (Figs. 60, 65, 70) has fully developed, 6-toothed, mandibles and smooth and shining propodeal dorsum.

Measurements. Worker. TL 3.7–4.3; HL 0.83–0.92; HW 0.68–0.78; CI 82–86; SL 0.63–0.70; SI 89–93; PCI 18–23; PnW 0.46–0.52; AL 1.05–1.15; PSI 1.22–1.52; PeL 0.37–0.43; PPL 0.25–0.28; PeH 0.21–0.25; PPH 0.22–0.25; PeW 0.16–0.20; PPW 0.23–0.26; PI1 65–68; PI2 54–55; MTL 0.59–0.67; TI 83–87 (4 measured).

Gyne. TL 4.5–4.7; HL 0.91–0.95; HW 0.75–0.79; CI 82–84; SL 0.70–0.72; SI 91–93; PCI 22–23; AL 1.32–1.35; PSI 1.61–1.84; ScW 0.63–0.67; MnL 0.94–0.99; PeL 0.46–0.49; PPL 0.28–0.31; PeH 0.25–0.26; PPH 0.26–0.29; PeW 0.20–0.21; PPW 0.27–0.31; PI1 61–64; PI2 60–62; MTL 0.67–0.72; TI 85–96 (3 measured).

Male. TL 3.8–4.0; HL 0.64–0.73; HW 0.58–0.62; CI 85–91; SL 0.22–0.25; SI 38–40; AL 1.27–1.35; ScW 0.59–0.65; MnL 0.88–0.97; PeL 0.39–0.45; PPL 0.24–0.28; PeH 0.21; PPH 0.22; PeW 0.19; PPW 0.26–0.27; PI1 62; PI2 67–73; MTL 0.88–0.91; TI 147–152 (2 measured).

Material examined

UNITED KINGDOM. London: Enfield, x.1906; Guernsey: St. Martins, xi.1992 (*C. David*); Devon: Double Waters (Tavy Valley), 2.xi.1968; Berkshire: Owlsmoor, nr. Crowthorne Berks, 18.ix.1957; Oxfordshire: Emmer Green, su 7/8773, 17.ix.1993 nest in flowerbed (*D.G. Notton*).

FRANCE. Midi-Pyrénées: Foix sur Ariège, 1-15. vi.1914 (*A. Dodero*)

Distribution. South United Kingdom, Belgium, the Netherlands (Seifert, 2007) and Southwest France.

Comment. I saw relatively few specimens of genuine *S. westwoodii*. Among the distinctive features pointed out by DuBois (1993) the narrow posterior clypeal portion and the "leggy appearance" of female castes are useful; however, the latter is shared with other species. Although I consider DuBois measurements quite inaccurate as regards the posterior clypeus, *S. westwoodii* does show a slightly different shape of the latter, which is narrower than in related taxa. In most *Stenamma* the posterior clypeal lobe is somewhat parallel-sided between the frontal lobes; whereas in *S. westwoodii* it is slightly narrower in front than behind forming a sort of "neck" (for instance, compare Figs. 16 and 21). As Seifert (2007) more carefully stated in his keys, in *S. westwoodii* that portion is as narrow as about 1/6 of the maximum distance between the frontal lobes at the level of antennal insertions. In *S. debile*, and other species, that ratio is about 1/4 to 1/3. My measurements show a ratio (expressed as a percentage, PCI) of about 1/5 to nearly 1/4 for *S. westwoodii*.

DuBois (l.c.) defined *S. westwoodii* as more "leggy" because the species has longer appendages than *S. debile* (compare SI and TI in Table 1 and 2). This feature makes *S. westwoodii* closer to *S. sardoum* and to *S. africanum* (see below for its revival from synonymy with *S. msilanum*). Also, all of these three species share other features: 1) in workers the main sculpture of pronotum (see Figs. 11, 13, 15 and 33, 35, 37), especially laterally, is more or less irregularly reticulate-rugulose rather than prevailingly longitudinally rugulose (for instance, compare with Figs 8, 12 and 31, 34); and 2) the petiole in profile has a more pronounced concavity below the node (Figs. 26, 28, 30) and looks somewhat more slender. In addition, I realized that *S. westwoodii* seems more closely related to *S. sardoum*. Besides evident differences in PCI, other seemingly important characters concern the sculpturation of promesonotum and the PPH. In *S. westwoodii* the promesonotum has a median irregular, but easily identifiable, carina which is mostly crossed by several transverse irregular rugulae and the dorsum looks quite loosely areolate (Fig. 35). In *S. sardoum* the median carina is less evident and the remaining sculpturation is even more irregular (Fig. 33).

Moreover, *S. westwoodii* has a relatively higher postpetiole, which looks less elongate than in *S. sardoum* (compare Figs. 26 and 28).

DuBois (1993) pointed out that in dorsal view the petioles of *westwoodii* and *debile* are different. As mentioned above, in the comments on *debile*, I tried such a comparison and found that in *westwoodii* (as well as in *sardoum*, and *msilanum*) the petiole in dorsal view

is more parallel sided than in *S. debile*, whose petiole is more distinctly narrower anteriorly. Also, the male of *S. westwoodii* is distinctly different from that of *debile* (compare Figs. 60, 65, 70 with Figs. 57, 61, 66), as already reported by DuBois (1993).

Finally, I also assign to this taxon a single worker labeled: Foix Ariège (Gallia) [=FRANCE], 1/15.VI.1914, leg. A. Dodero. It is indistinguishable from British *westwoodii* specimens, including the promesonotal sculpturation; but its gaster has the first tergite finely and superficially reticulate-punctate on most of its surface. I found a similar sculpture in a worker from UK, and therefore I would presume the occurrence of such sculpture to be normal variation and relatively widespread in this species.

Stenamma zanoni n. sp.

(Figs. 7, 14, 22, 29, 36, 62, 67, 72)

Diagnostic features. A relatively large taxon, with moderately elongate scapes, and several standing hairs on tibiae (Fig. 72) and scapes. The worker has short and stout, somewhat upturned propodeal teeth (Figs. 7 and 14). The male has about the same pilosity as in the worker and has notauli almost absent (Fig. 67).

Measurements. Holotype (worker). TL 4.3; HL 1.00; HW 0.81; CI 81; SL 0.80; SI 99; PCI 25; PnW 0.57; AL 1.23; PSI 1.24; PeL 0.44; PPL 0.24; PeH 0.25; PPH 0.25; PI1 55; PI2 54; MTL 0.72; TI 89; PeW 0.18; PPW 0.24.

Worker. TL 4.2–4.7; HL 0.94–1.02; HW 0.77–0.84; CI 80–84; SL 0.73–0.82; SI 95–99; PCI 27–31; PnW 0.52–0.59; AL 1.21–1.30; PSI 1.19–1.64; PeL 0.42–0.46; PPL 0.23–0.25; PeH 0.24–0.25; PPH 0.24–0.26; PeW 0.17–0.20; PPW 0.22–0.25; PI1 51–57; PI2 52–56; MTL 0.68–0.75; TI 85–90 (7 measured).

Male. TL 4.3–4.6; HL 0.68–0.77; HW 0.57–0.65; CI 84; SL 0.33–0.36; SI 55–58; AL 1.38–1.50; ScW 0.65–0.73; MnL 0.94–1.06; PeL 0.47–0.50; PPL 0.25–0.27; PeH 0.20–0.25; PPH 0.21–0.25; PeW 0.16–0.20; PPW 0.23–0.27; PI1 53–54; PI2 77–82; MTL 0.93–1.04; TI 160–163 (2 measured).

Description. *Worker* (Figs. 7, 14, 22, 29, 36). Mandibles 9-10 toothed, longitudinally rugose with distinct piligerous pits. Anterior clypeal border shallowly concave in the middle; posterior clypeal lobe about 1/4 or more as wide as the frontal lobe distance. Head (Fig. 22) distinctly longer than wide with moderately convex sides, narrower at occipital angles than at mandibular insertion; mostly areolate with longitudinal rugulation, especially medially, and a quite well developed reticulate-punctate ground sculpture. Scape moderately long, reaching or at most hardly surpassing the posterior margin of the head when laid back. Posterior margin of the head straight. Eye with some 10 or less ommatidia.

Pronotum anteriorly transversely rugulose. Promesonotal surface (Fig. 36) largely irregularly longitudinally rugulose and with very weak ground sculpture, except laterally where it is more developed. Mesopleuron mostly reticulate-punctate with superimposed irregular rugulation. Mesosoma in profile (see Fig. 14) with promesonotum forming a very shallow convexity; metanotal groove V-shaped, the propodeal dorsum rises steeply from it into a flat dorsal face. Propodeum dorsally and laterally mostly irregularly areolate with reticulate-punctate ground sculpture; declivity smooth and shining. Propodeal teeth strong and short, when more developed they are distinctly upturned. Waist (Fig. 29) finely reticulate-punctate with some scattered short irregular rugulae; nodes appearing mostly smooth and shining. Petiole with a relatively narrowly domed node, its sternite distinctly concave at node level and with a vestigial anterior subpetiolar process. Postpetiole in profile relatively short and high; its sternite faintly concave and with a slightly protruding anterior process. In dorsal view petiole nearly as wide at the level of the spiracles as at the node.

Pilosity mostly as in other species dealt with in this paper; but extensor surface of tibiae (Fig. 72) and dorsal surface of scapes bear few to several subdecumbent to suberect hairs that are raised above the level of the pubescence. Such hairs do not always clearly project beyond the pubescence.

Colour chiefly brown, with a more or less developed ferrugineous tinge and chiefly testaceous legs, antennae, clypeus and mandibles. Gaster slightly paler than the remaining body, except for most of the first tergite.

Gyne unknown.

Male (Figs. 62, 67). Mandibles fully developed, 6-toothed, superficially finely striolate and shining. Head (Fig. 62) in full face view with weakly convex sides and straight posterior margin; its surface finely reticulate-punctate with superimposed, mainly longitudinal and irregular rugulation. Pronotum rugulose with weak ground sculpture. Mesoscutum with vestigial notauli (Fig. 67). Mesonotum longitudinally rugulose, except laterally. Sides of mesosoma mostly reticulate punctate; mesopleuron smoother, propodeum with rougher sculpture and partially rugose. Propodeal dorsum very superficially reticulate-punctate and about as shiny as the declivity. In profile propodeal dorsum about twice as long as the declivity. Petiole and postpetiole mostly finely reticulate-punctate, except for their nodes, which are smooth or nearly so. Waist sternites at most weakly concave in profile; postpetiole with a small protruding point anteriorly.

Pubescence mostly decumbent and especially abundant on the appendages, standing hairs sparse and mostly abundant on mesonotum and gaster. Some subdecumbent hairs occur on the outer edge of the tibiae.

Colour dark blackish brown; legs mostly brown, antennae brown with last 5 joints pale testaceous, mandibles testaceous.

Holotype (worker): ITALY, FRIULI VENEZIA GIULIA, Osoppo (Udine), 30.iv.2001, excavation nr. fortress (*D. Zanon*) (MSNM)

Paratypes. 5 workers with the same data as the holotype (MSNM). 1 male: ITALY, LOMBARDIA, Monza park (Monza-Brianza), 25.ix.1985 (*F. Rigato*) (MSNM). 1 worker: SWITZERLAND, CANTON TICINO, Calonico-Leventina, 950 m (*A. Focarile*) [original labels: HELVETIA (Ticino) Calonico-Leventina, 950 m A. Focarile/Castanetum insubricum] (MHNG); 1 worker: SWITZERLAND, CANTON TICINO, Piccola Isola di Brissago, 12-19.vii.1986 (*E. Della Santa*) [original label: SUISSE – Tessin, P.te île Brissago, 12-19.7.86, E. Della Santa] (MHNG). 1 male: SWITZERLAND, CANTON TICINO, San Nazzaro, 30.ix.1962. (MZL)

Comment. An easily distinguished taxon. Its size is close to *petiolatum*, with which it may be superficially confused (e.g. Della Santa, 1988, and see below); yet the only strong similarity between them is the presence of raised hairs on tibiae and scapes. Other diagnostic features, such as SI (see Table 1), promesonotal sculpture, propodeal teeth and waist shape are strikingly different.

I borrowed the worker reported by Della Santa (1988) as *S. petiolatum* and when I received it and several other Swiss *Stenamma* collected from close localities, I was surprised to find that his specimen and another one actually belonged to my new taxon, of which I had just few workers from Northeast Italy, quite far from Switzerland.

As mentioned above in the "comment" to *S. petiolatum*, I confidently assign to *S. zanoni* the male that Kutter (1971) described as belonging to *S. petiolatum*, and a male I have from North Italy (Monza park) is also included. Initially, I thought these two males could belong to different taxa because Kutter's figures show a relatively high propodeum with basal and declivitous faces very similar in length, whereas my own specimen has the basal propodeal face about twice as long as the declivity. I examined Kutter's male (borrowed from MZL), and realized that Kutter's figure is somewhat inaccurate. His male is very similar to mine and must be considered as conspecific with it.

The male of *S. zanoni* is strikingly different from any other known European *Stenamma* male because of its virtually absent notauli (Fig. 67), which are well developed in all other taxa. Also, Kutter (l.c.) correctly pointed out the relatively strong development of mid and hind legs' tibial spurs in his "*S. petiolatum*" male. In fact his male, as well as the worker, has relatively well developed spurs when compared with other taxa, but in my male from "Monza park" the spurs are less developed. However, this is not considered a fully reliable feature for separating taxa, both for lack of sufficient material and for some variations I observed among females and males of other *Stenamma*. Mid and hind tibial spurs in most *Stenamma* I examined are reduced and often hardly visible, or even appear completely lacking (e.g. in *S. striatulum*): they are short and thin at most and easily confused with the pilosity of the tibial apices. About this feature Branstetter (2009) reported for *Stenamma*'s worker caste: "middle and hind tibiae lacking spurs" (character 17, page 43). I propose to modify this statement to: "middle and hind tibial spurs variable, usually reduced or absent".

Stenamma africanum Santschi and *S. msilanum* Forel

While examining *S. siculum* a comparison was made with its apparently closest relative, *S. msilanum* (*sensu* DuBois, 1998, who considered *africanum* to be a junior synonym of *msilanum*) and *S. africanum* type series, which consists of a few workers and one gyne, was borrowed from NHMB. Workers come from several Tunisian localities and one specimen is from Bône (currently Annaba), a coastal locality of Northeast Algeria, not far from Tunisia. All workers appear consistent and I consider them as conspecific and also conspecific with the type of *S. africanum* var. *submuticum* Santschi, which was also examined. The measurements given by DuBois for the lectotype he designated are misleading. He gave a SI of 115, which is considerably higher than any other species dealt with in this paper. Such an index would mean a scape strongly surpassing the posterior margin of the head when laid back, even exceeding that of *S. petiolatum*. However, on examination the lectotype turned out as quite ordinary with SI = 95 and scape's apex closely approaching the posterior margin of the head when laid back. Paralectotypes have a slightly higher SI as also does a separate series from Tunisia that I examined. Other features of *S. africanum* worker are the relatively low postpetiole, looking longer than high (PPL>PPH), and the shallow, but easily visible, concavity of petiolar sternite in profile at the level of the node (Fig. 30). The gyne of *S. africanum* in the type series comes from "Col de Talmetz". Although both Santschi (1939) and DuBois (1998, as "Col de Talmet") reported this as a Tunisian locality, I found it to be in North Algeria (ca. 36°41' N and 4°43' E), and quite distant from where *S. africanum* workers were collected. However, I consider that the gyne is conspecific with the workers, even though it has SI = 91, and a less concave petiolar sternite.

Finally, I examined the holotype of *S. msilanum*. It was described from a single gyne collected in the forest of Msila (Oran prov., Algeria), which is relatively close to Morocco. In my opinion it is not conspecific with *S. africanum*. The most striking differences lie in colour and petiolar shape. The *S. msilanum* type is as dark as *S. debile* gynes (*S. africanum* is ferrugineous), and its waist's sternites are fully straight in profile.

Consequently, I propose to formally resurrect *S. africanum* as a valid species, with *submuticum* as its junior synonym, different from *S. msilanum*.

Stenamma africanum Santschi stat. rev.
(Figs. 15, 23, 30, 37)

Stenamma africanum Santschi, 1939: 66, fig. 2. Lectotype worker, paralectotype workers and gyne, TUNISIA: Aïn-Draham (*Normand*) [Lectotype]; Camp de la Santé (*Normand*); Camp de Bugeaud (*Normand*); ALGERIA: Col de Talmetz, 11.x.1928 (*Normand*) (NHMB) [examined]. **Stat. rev.** [Previously synonymised with *msilanum* by DuBois, 1998: 254.]

Stenamma africanum var. *submuticum* Santschi, 1939: 67, fig. 3. Holotype worker, ALGERIA. Bône (*Normand*) (NHMB) [examined]. **Syn. n.** [Previously synonymised with *msilanum* by DuBois, 1998: 254.]

Diagnostic features. *Stenamma africanum* is a relatively large species with elongate scapes and with a posterior clypeal lobe often as narrow as in some *S. westwoodii* specimens. The petiolar sternite is shallowly, but distinctly, concave below the node.

Measurements. Lectotype (worker). TL 4.1; HL 0.92; HW 0.77; CI 84; SL 0.73; SI 95; PCI 28; PnW 0.53; AL 1.12; PSI 1.65; PeL 0.40; PPL 0.25; PeH 0.21; PPH 0.20; PeW 0.15; PPW 0.21; PI1 62; PI2 52; MTL 0.63; TI 82.

Worker (including paralectotypes). TL 3.5–4.1; HL 0.86–0.95; HW 0.69–0.78; CI 80–84; SL 0.68–0.76; SI 95–100; PCI 23–31; PnW 0.47–0.54; AL 1.00–1.13; PSI 1.2–1.7; PeL 0.37–0.43; PPL 0.23–0.26; PeH 0.20–0.24; PPH 0.20–0.23; PeW 0.14–0.17; PPW 0.20–0.23; PI1 56–65; PI2 51–60; MTL 0.59–0.67; TI 83–92 (11 measured).

Gyne. TL 4.9; HL 1.02; HW 0.87; CI 85; SL 0.79; SI 91; PCI 32; AL 1.48; PSI 1.57; ScW 0.75; MnL 1.11; PeL 0.54; PPL 0.27; PeH 0.27; PPH 0.29; PeW 0.21; PPW 0.28; PI1 50; PI2 62; MTL 0.74; TI 85 (1 measured).

Material examined

ALGERIA. Bône (*Normand*); Col de Talmetz, 11.x.1928 (*Normand*).

TUNISIA. Aïn-Draham (*Normand*) [Lectotype]; Camp de la Santé (*Normand*); Camp de Bugeaud (*Normand*); forêt de Ghardimaou, Feidja El Feidja (and Feidja Ain Soltane), 13.IV.1989 (*Meregalli*)

Comment. *S. africanum* worker shares most features with *S. sardoum* and *S. westwoodii*; but it has longer scapes (compare SI in Table 1), almost reaching the occipital border when laid back.

Cagniant (1971) described the male of *S. africanum*. His diagnosis, drawings and description look comparable to those of *S. siculum*, which has more sculptured propodeal dorsum and standing hairs on scapes. The propodeum is smoother in North African specimens from Algeria and Morocco (Cagniant l.c. and pers. comm.): «*propodeum: sur les côtés quelques rides longitudinales et sinueuses se détachant mal de la forte réticulation de base; sur le dessus: réticulé sans rides, la réticulation devenant superficielles et même disparaissant presque dans la zone médiane; face postérieure: luisante, avec 2 ébauches de rides transverses*». Unfortunately, I could not see Cagniant's males and associated females. Because knowledge of North African *Stenamma* is still incomplete, I remain unsure about the identity of his specimens.

Stenamma msilanum Forel

Stenamma westwoodi var. *msilanum* Forel, 1901: 347. Holotype gyne, ALGERIA: Forêt de Msila (MHNG) [examined].

Stenamma msilanum Forel. DuBois, 1998: 254. [Raised to species].

Holotype (Gyne). TL 4.7; HL 0.94; HW 0.81; CI 86; SL 0.72; SI 89; PCI 31; AL 1.32; PSI 1.73; ScW 0.64; MnL 0.93; PeL 0.45; PPL 0.28; PeH 0.27; PPH 0.28; PeW 0.19; PPW 0.28; PI1 62; PI2 56; MTL 0.71; TI 88.

Comment. *S. msilanum* gyne looks quite ordinary and mostly recalls *S. debile*, especially in its dark colour and waist shape; but it has significantly longer appendages than *debile* (compare SL, SI, MTL and TI in Table 2).

DISCUSSION

In this paper I have attempted to clarify the position of some misunderstood taxa and to improve the characters that define the species, especially for Italian *Stenamma*. Comparisons with *S. westwoodii*, *S. africanum* and *S. msilanum* have been added to complete the picture of the whole species group as it occurs in the area under consideration. I can confirm that *S. debile*, usually considered as a "typical *Stenamma*" because of its stouter legs (see DuBois, 1993), is isolated by reduced mandibular dentition in the male, and the relatively short appendages in the female castes. Other isolated taxa are *S. striatulum*, which is the smallest species and has the finest sculpturation; *S. petiolatum*, the largest and most elongate species, and with standing hairs on the appendages, and *S. zanoni*, a relatively thickset species with appendages' pilosity as in *petiolatum*. The remaining species, *S. sardoum*, *S. siculum*, *S. africanum* and *S. westwoodii* seem more closely related to one another than to any of the previously mentioned taxa. They share relatively elongate legs and scapes, mostly reticulate-rugose promesonotum, and slightly more elongate-looking petiole.

As already pointed out by Kutter (1971) and DuBois (1993), males are important in *Stenamma* taxonomy because they can be distinguished more easily than their conspecific females on the basis of stronger morphological features, especially by mandibular development and propodeal dorsum sculpture.

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Fig. 2 - *Stenamma debile.* Worker. / Operaia. (Photo / Foto Michele Zilioli).

Fig. 3 - *Stenamma petiolatum.* Worker. / Operaia. (Photo / Foto Michele Zilioli).

Fig. 4 - *Stenamma sardoum.* Worker. / Operaia. (Photo / Foto Michele Zilioli).

Fig. 5 - *Stenamma siculum.* Holotype gyne. / Regina olotipo (Photo / Foto Michele Zilioli).

Fig. 6 - *Stenamma striatulum*. Worker. / Operaia. (Photo / Foto Michele Zilioli).

Fig. 7 - *Stenamma zanoni*. Holotype worker. / Operaia olotipo. (Photo / Foto Michele Zilioli).

500 µm

Fig. 12 - *Stenamma striatulum*. Worker in profile. / Profilo dell'operaia. (Photo / Foto Michele Zilioli).

500 µm

Fig. 13 - *Stenamma westwoodii*. Worker in profile. / Profilo dell'operaia. (Photo / Foto Michele Zilioli).

200 µm
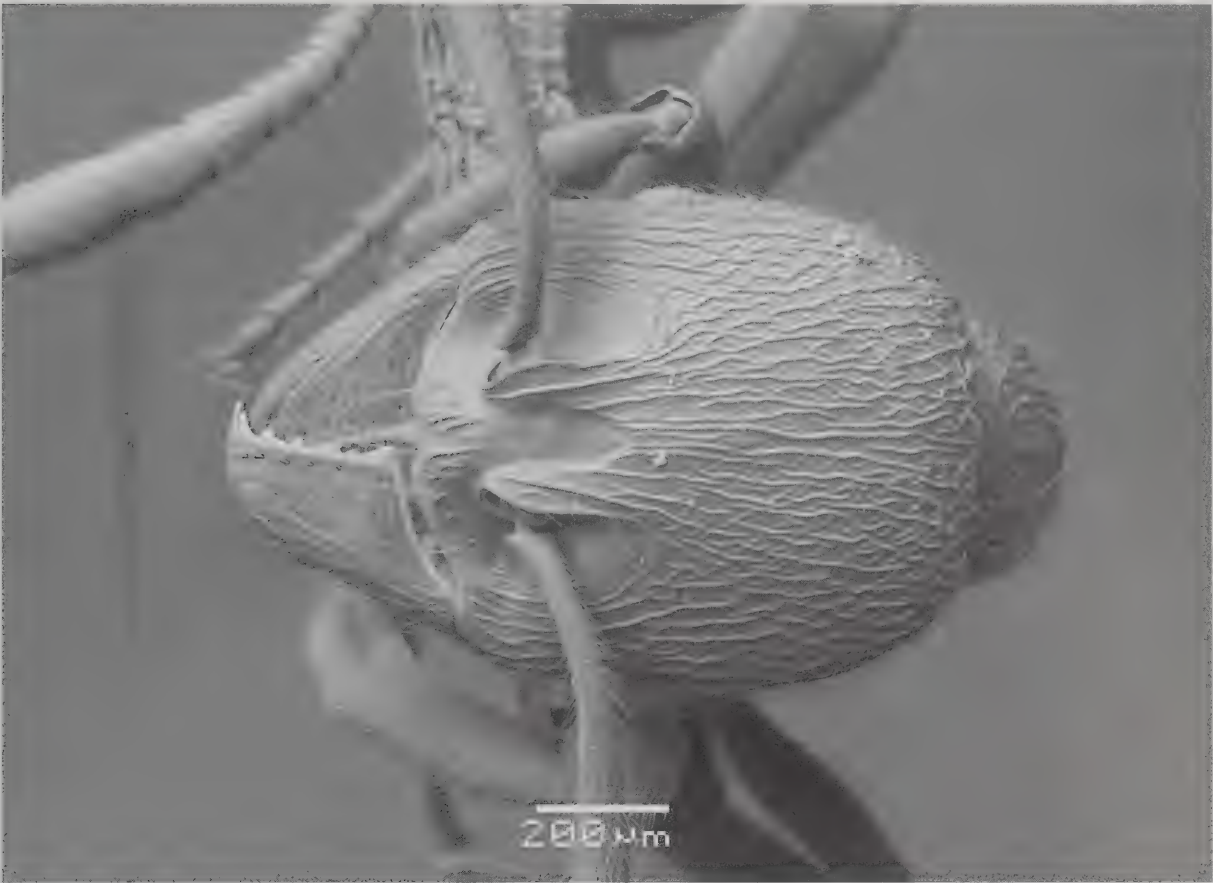
Fig. 16 - *Stenamma debile.* Worker, head in full face view. / Operaia, capo in visione frontale. (Photo / Foto Michele Zilioli).

200 µm

Fig. 17 - *Stenamma orousseti.* Holotype worker, head in full face view. / Operaia olotipo, capo in visione frontale. (Photo / Foto Michele Zilioli).
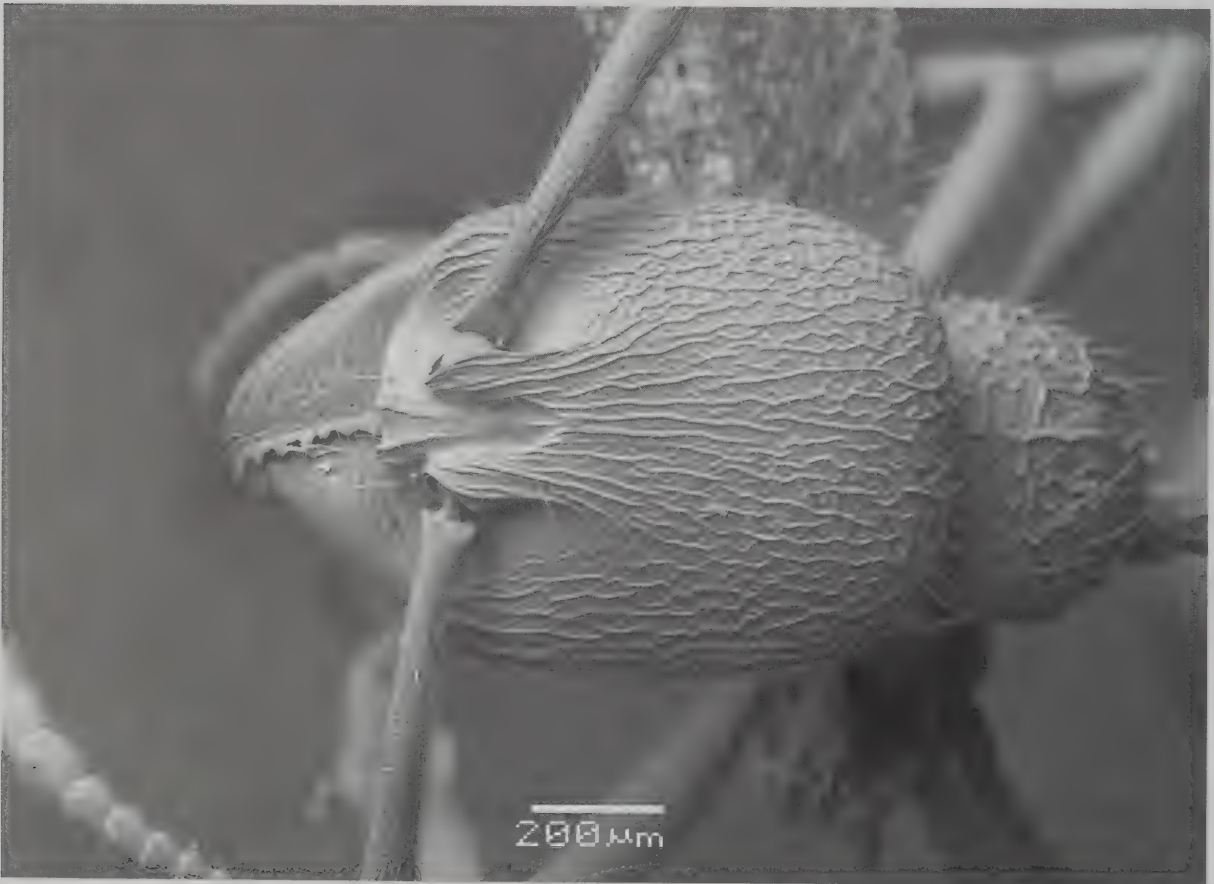
Fig. 20 - *Stenamma striatulum*. Worker, head in full face view. / Operaia, capo in visione frontale. (Photo / Foto Michele Zilioli).

Fig. 21 - *Stenamma westwoodii*. Worker, head in full face view. / Operaia, capo in visione frontale. (Photo / Foto Michele Zilioli).
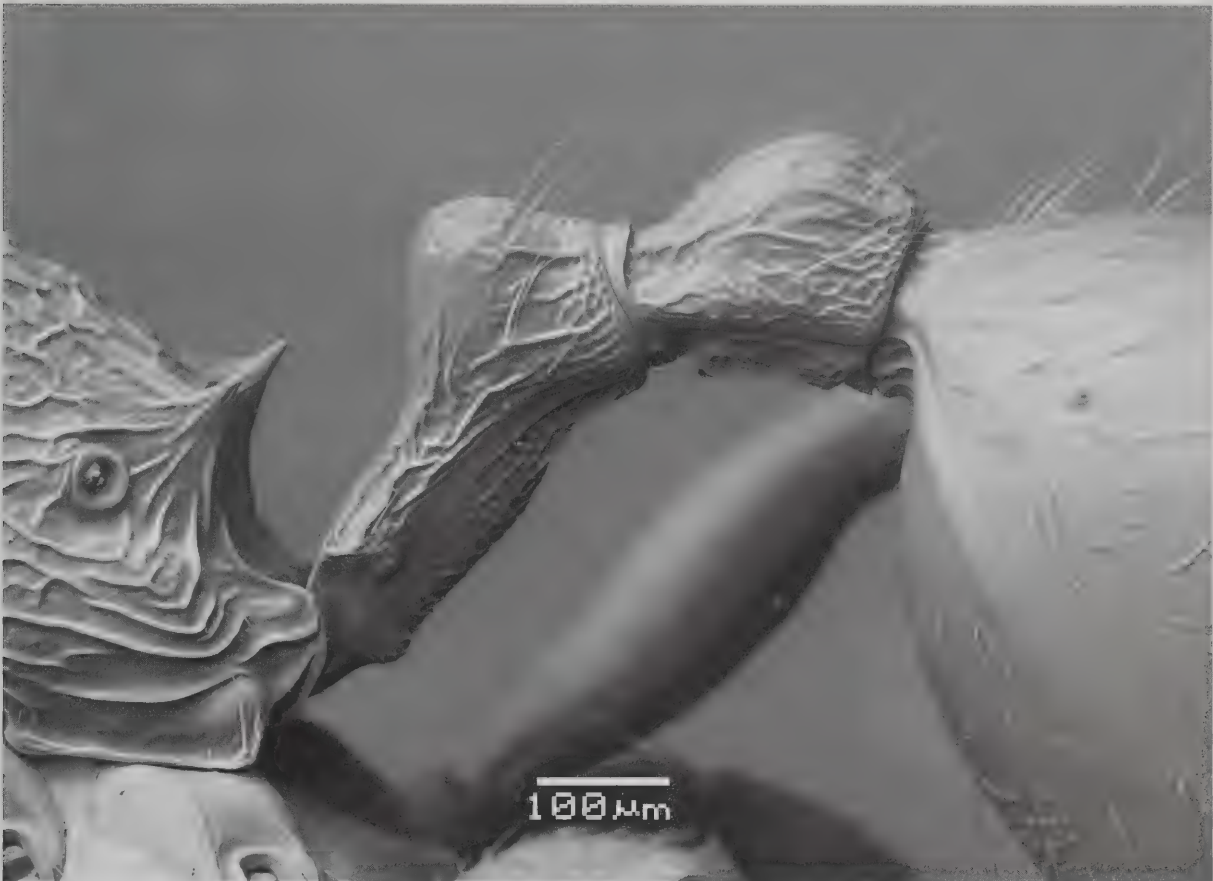
Fig. 24 - *Stenamma debile.* Worker, waist in profile. / Operaia, peduncolo in visione laterale. (Photo / Foto Michele Zilioli).

Fig. 25 - *Stenamma petiolatum.* Worker, waist in profile. / Operaia, peduncolo in visione laterale. (Photo / Foto Michele Zilioli).

Fig. 28 - *Stenamma westwoodii.* Worker, waist in profile. / Operaia, peduncolo in visione laterale. (Photo / Foto Michele Zilioli).
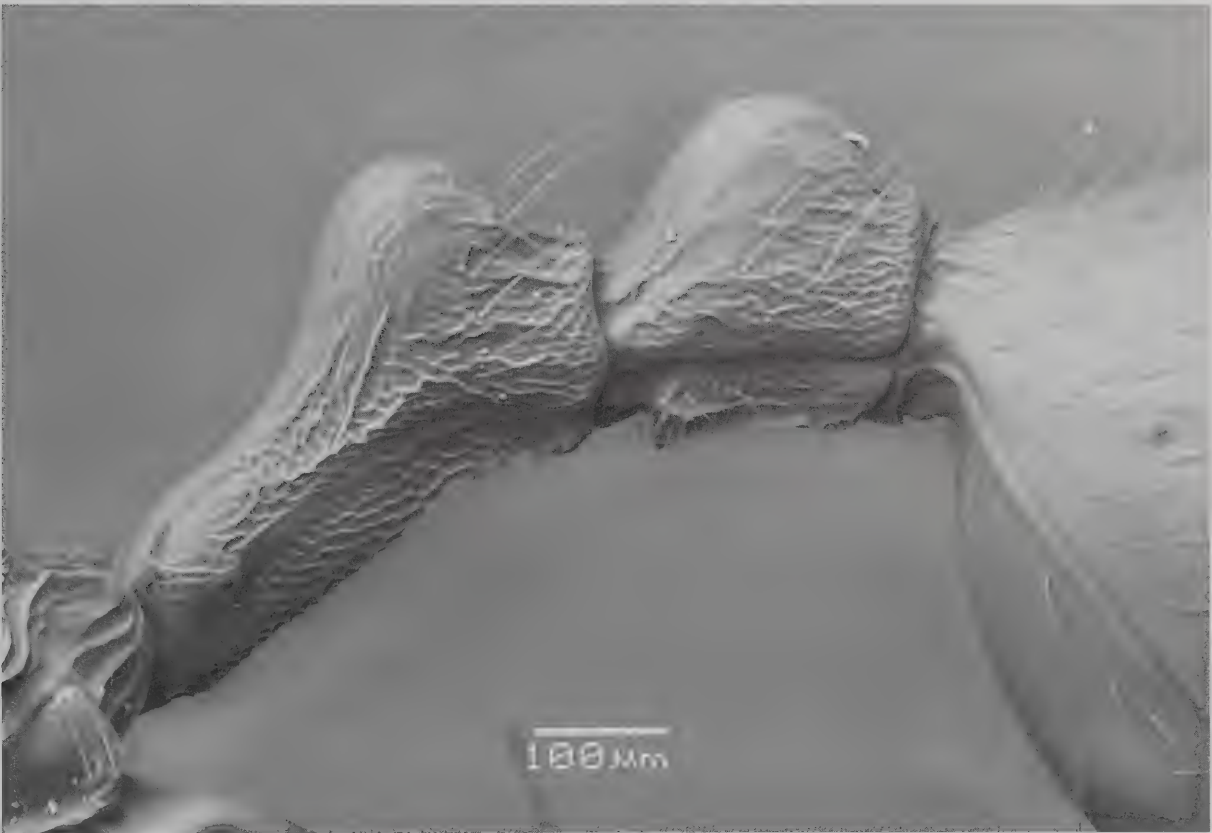
Fig. 29 - *Stenamma zanoni.* Holotype worker, waist in profile. / Operaia olotipo, peduncolo in visione laterale. (Photo / Foto Michele Zilioli).
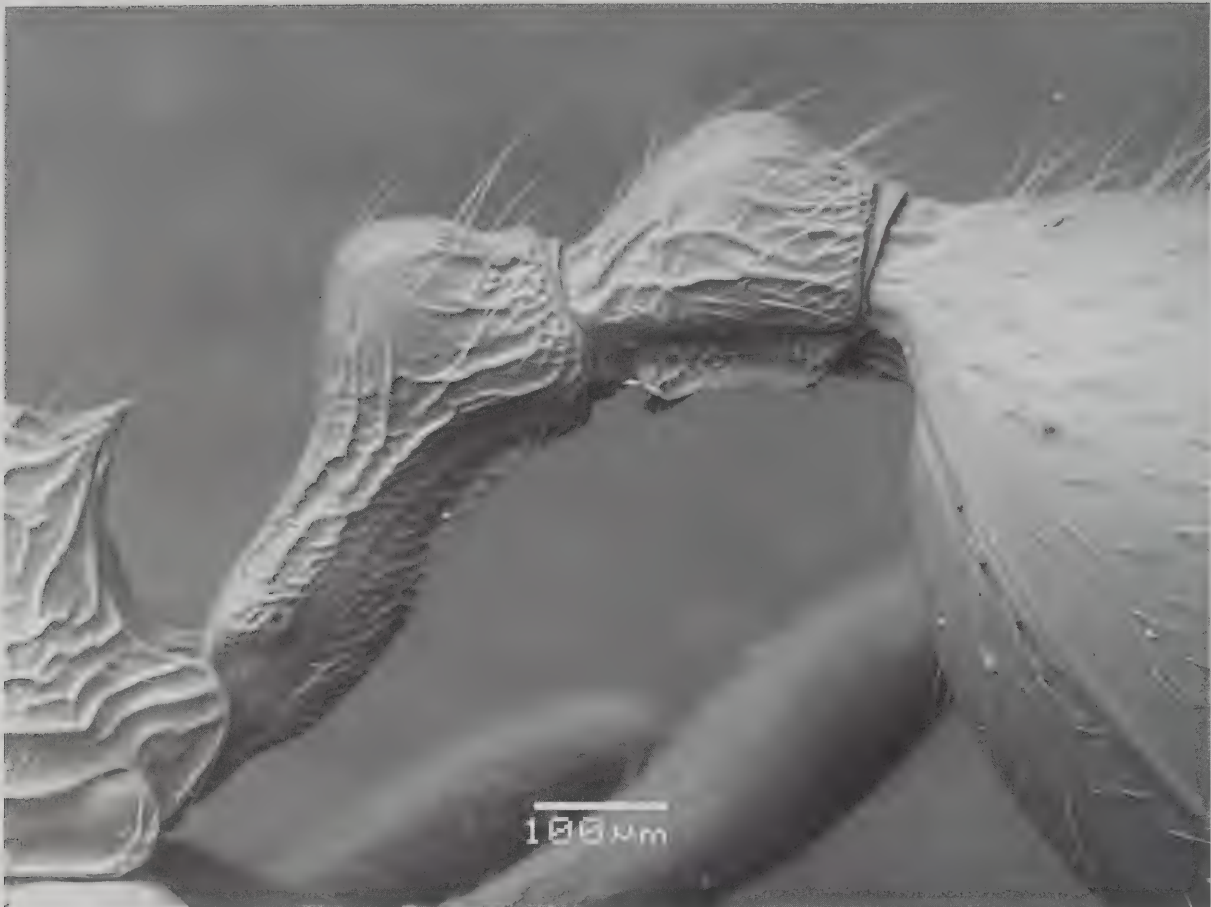
Fig. 30 - *Stenamma africanum.* Worker, waist in profile. / Operaia, peduncolo in visione laterale. (Photo / Foto Michele Zilioli).
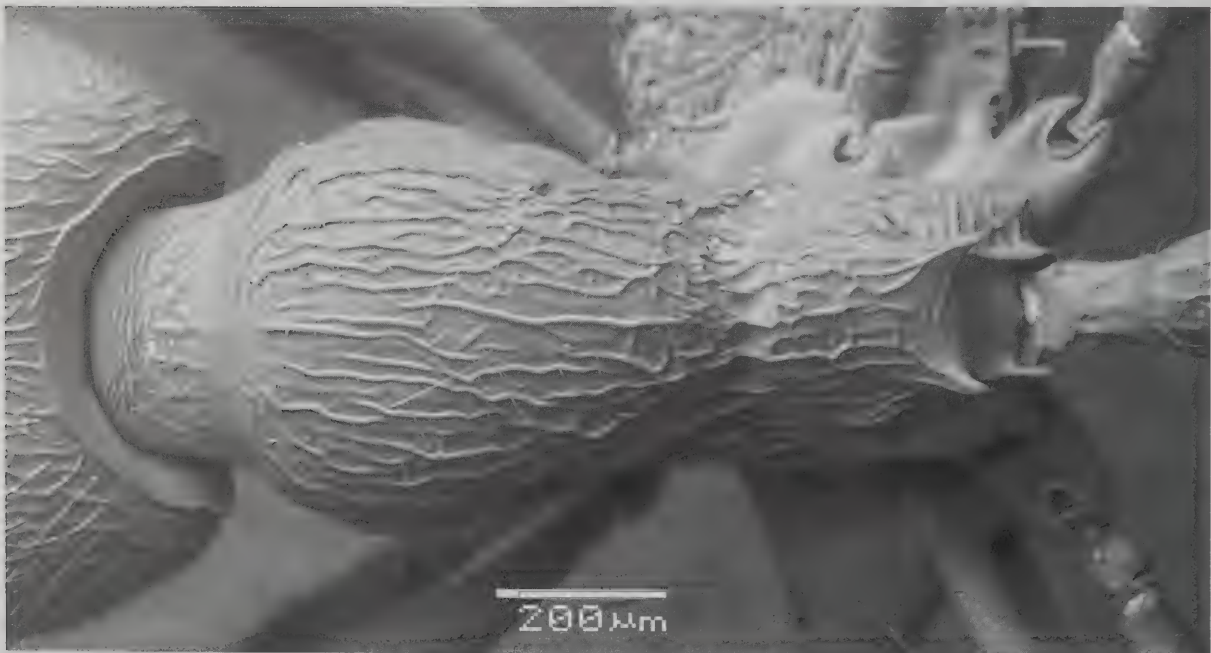
Fig. 31 - *Stenamma debile.* Worker, mesosoma in dorsal view. / Operaia, mesosoma in visione dorsale. (Photo / Foto Michele Zilioli).
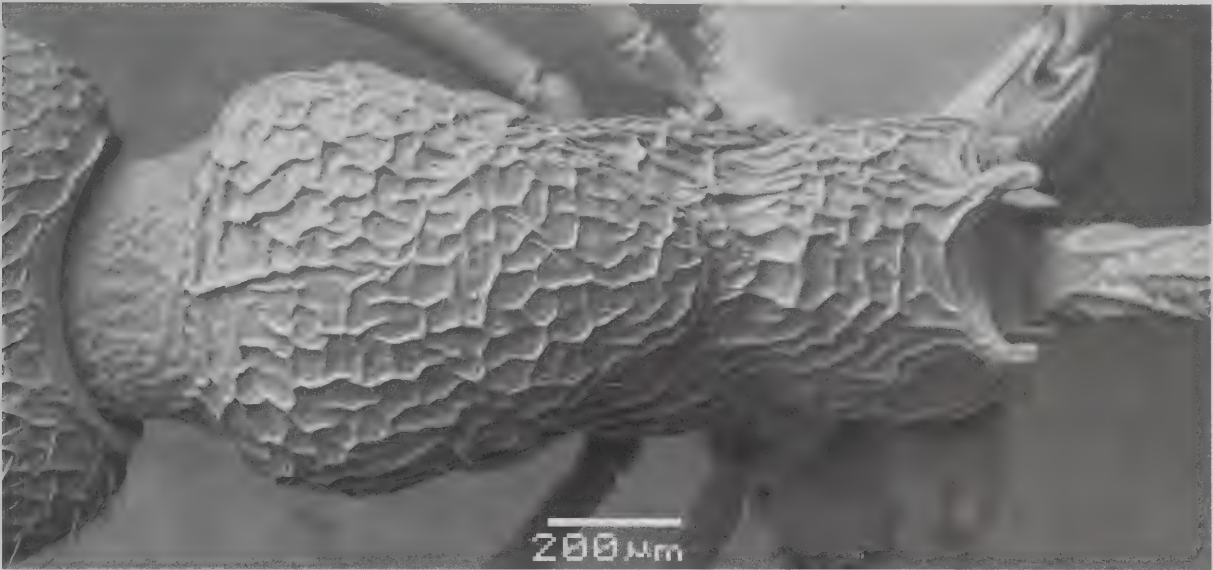
Fig. 32 - *Stenamma petiolatum*. Worker, mesosoma in dorsal view. / Operaia, mesosoma in visione dorsale. (Photo / Foto Michele Zilioli).
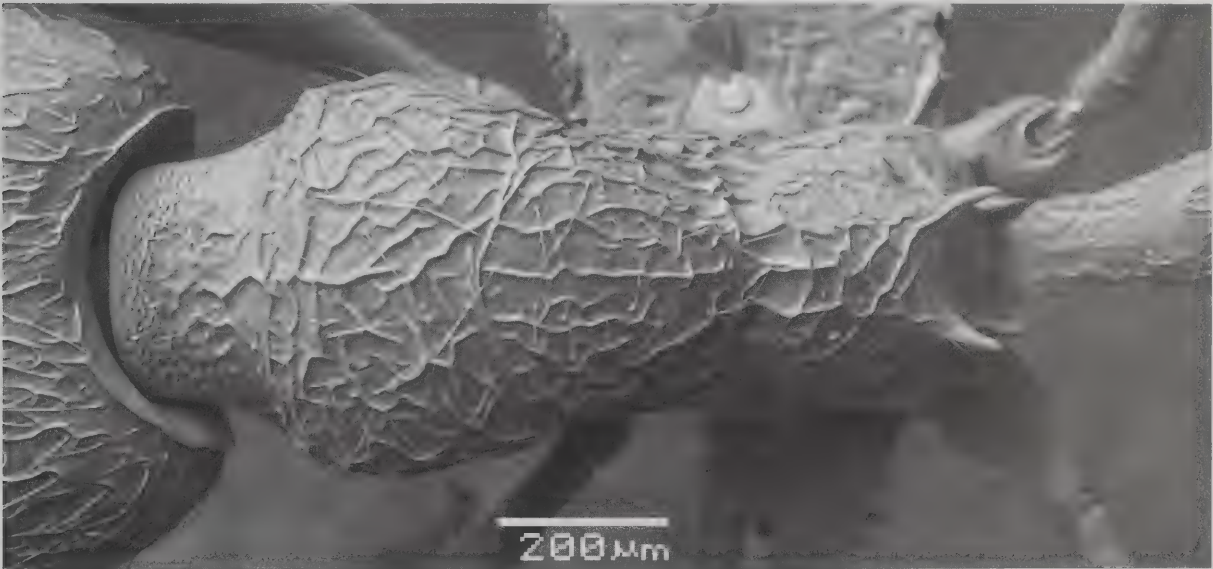
Fig. 33 - *Stenamma sardoum*. Worker, mesosoma in dorsal view. / Operaia, mesosoma in visione dorsale. (Photo / Foto Michele Zilioli).
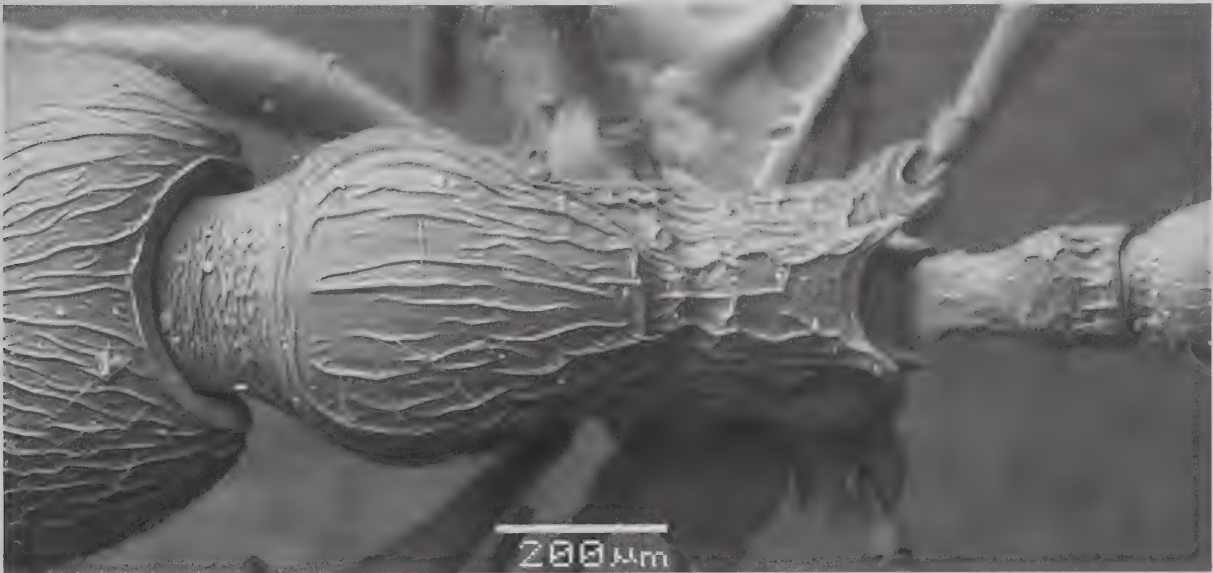
Fig. 34 - *Stenamma striatulum*. Worker, mesosoma in dorsal view. / Operaia, mesosoma in visione dorsale. (Photo / Foto Michele Zilioli).
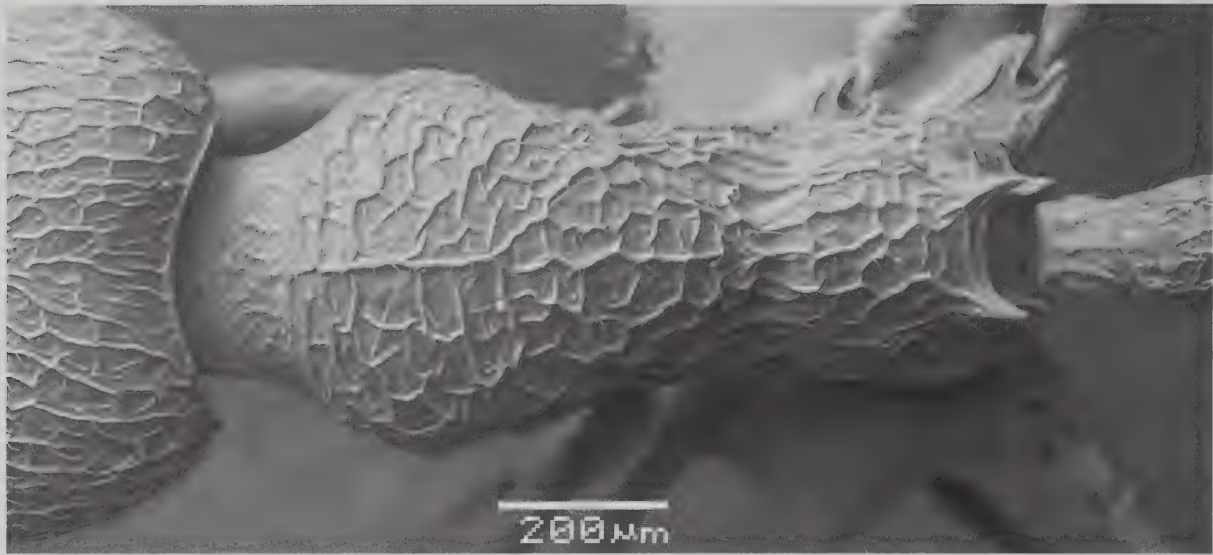
Fig. 35 - *Stenamma westwoodii.* Worker, mesosoma in dorsal view. / Operaia, mesosoma in visione dorsale. (Photo / Foto Michele Zilioli).
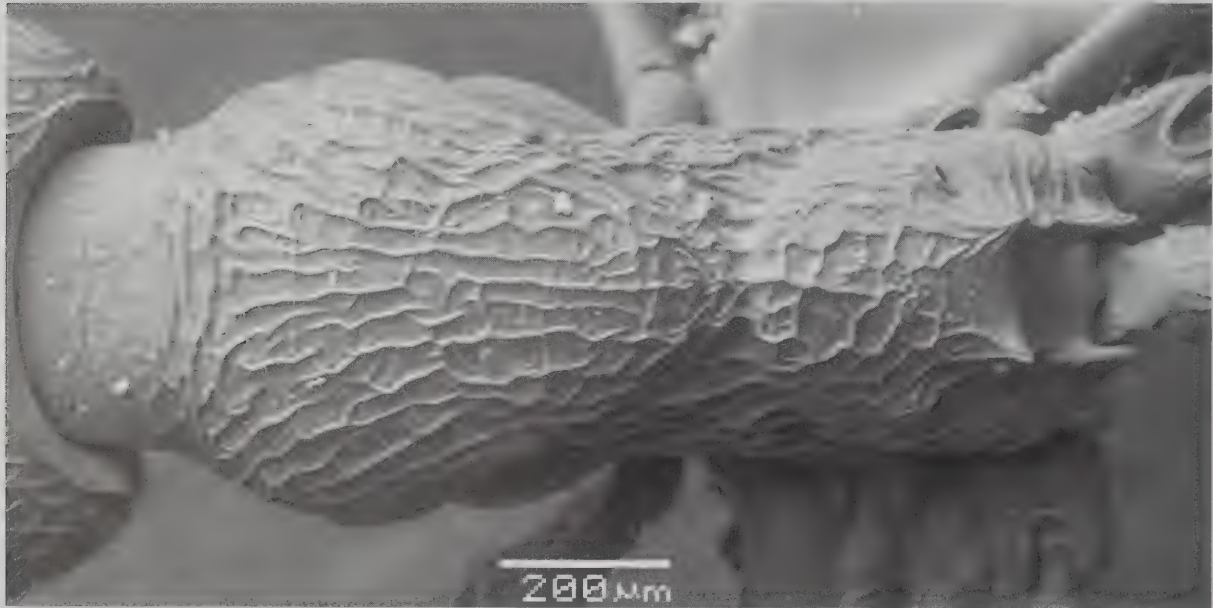
Fig. 36 - *Stenamma zanoni.* Holotype worker, mesosoma in dorsal view. / Operaia olotipo, mesosoma in visione dorsale. (Photo / Foto Michele Zilioli).
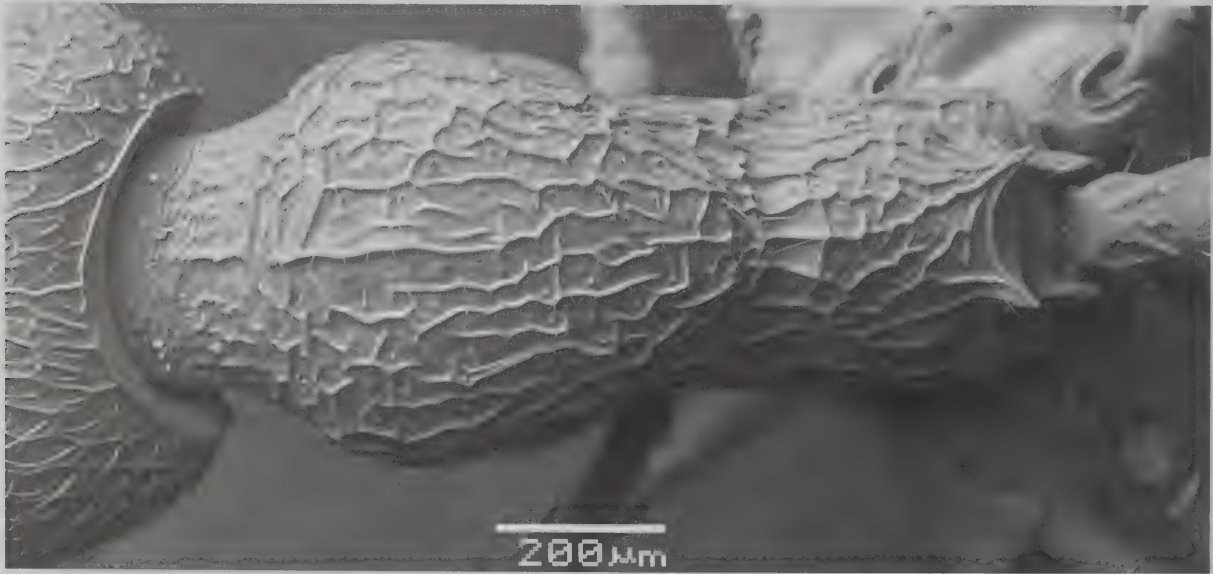
Fig. 37 - *Stenamma africanum.* Worker, mesosoma in dorsal view. / Operaia, mesosoma in visione dorsale. (Photo / Foto Michele Zilioli).

Fig. 38 - *Stenamma debile*. Gyne, mesosoma and waist in profile. / Regina, mesosoma e peduncolo in visione laterale. (Photo / Foto Michele Zilioli).

Fig. 39 - *Stenamma petiolatum*. Gyne, mesosoma and waist in profile. / Regina, mesosoma e peduncolo in visione laterale. (Photo / Foto Michele Zilioli).
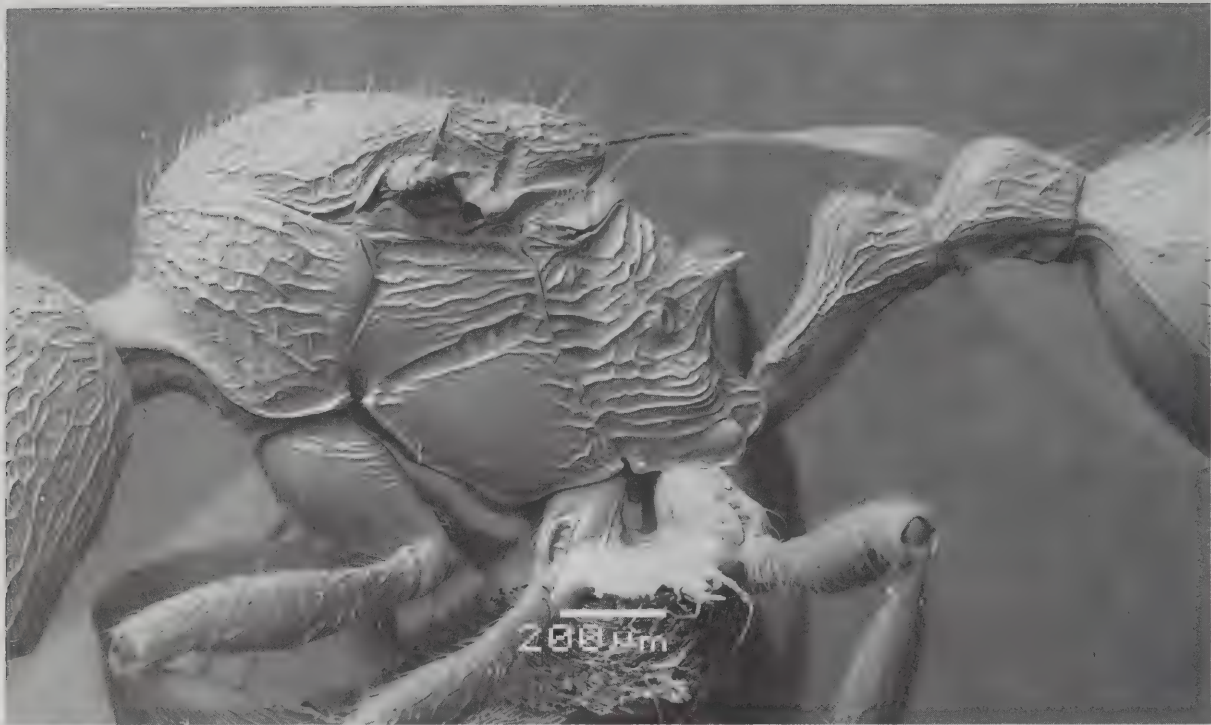
Fig. 40 - *Stenamma sardoum*. Gyne, mesosoma and waist in profile. / Regina, mesosoma e peduncolo in visione laterale. (Photo / Foto Michele Zilioli).

Fig. 41 - *Stenamma siculum*. Holotype gyne, mesosoma and waist in profile. / Regina olotipo, mesosoma e peduncolo in visione laterale. (Photo / Foto Michele Zilioli).

Fig. 42 - *Stenamma striatulum*. Gyne, mesosoma and waist in profile. / Regina, mesosoma e peduncolo in visione laterale. (Photo / Foto Michele Zilioli).
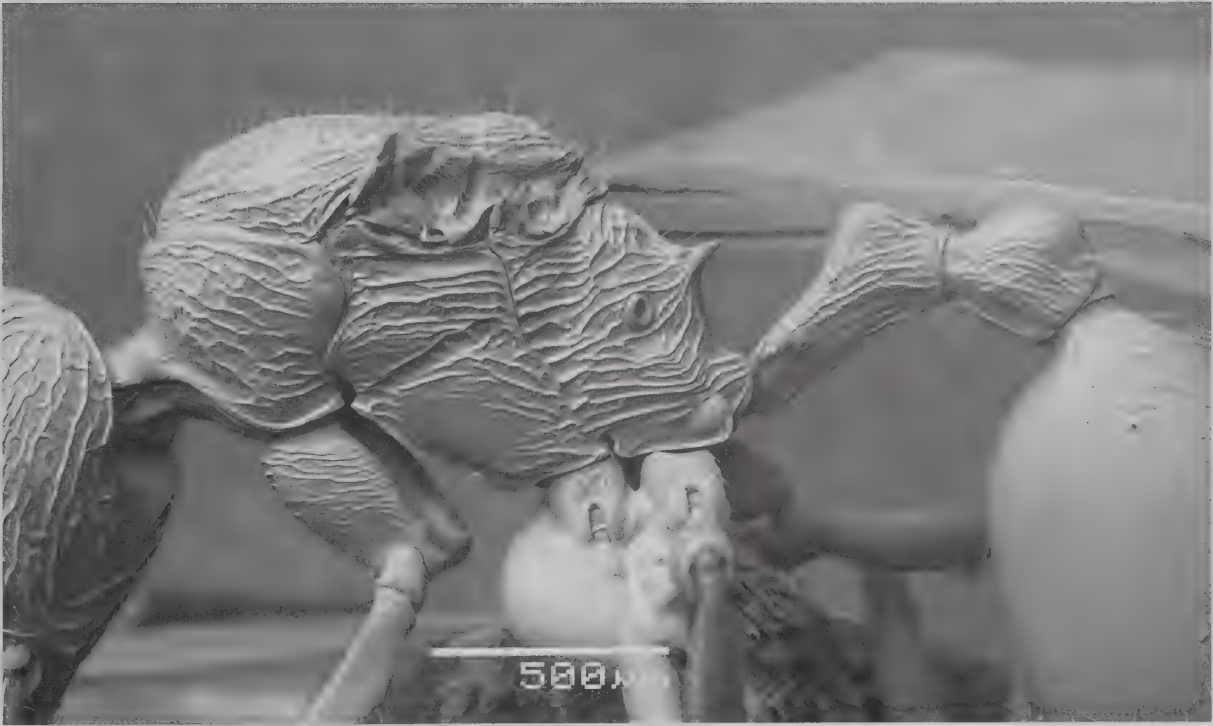
Fig. 43 - *Stenamma westwoodii*. Gyne, mesosoma and waist in profile. / Regina, mesosoma e peduncolo in visione laterale. (Photo / Foto Michele Zilioli).
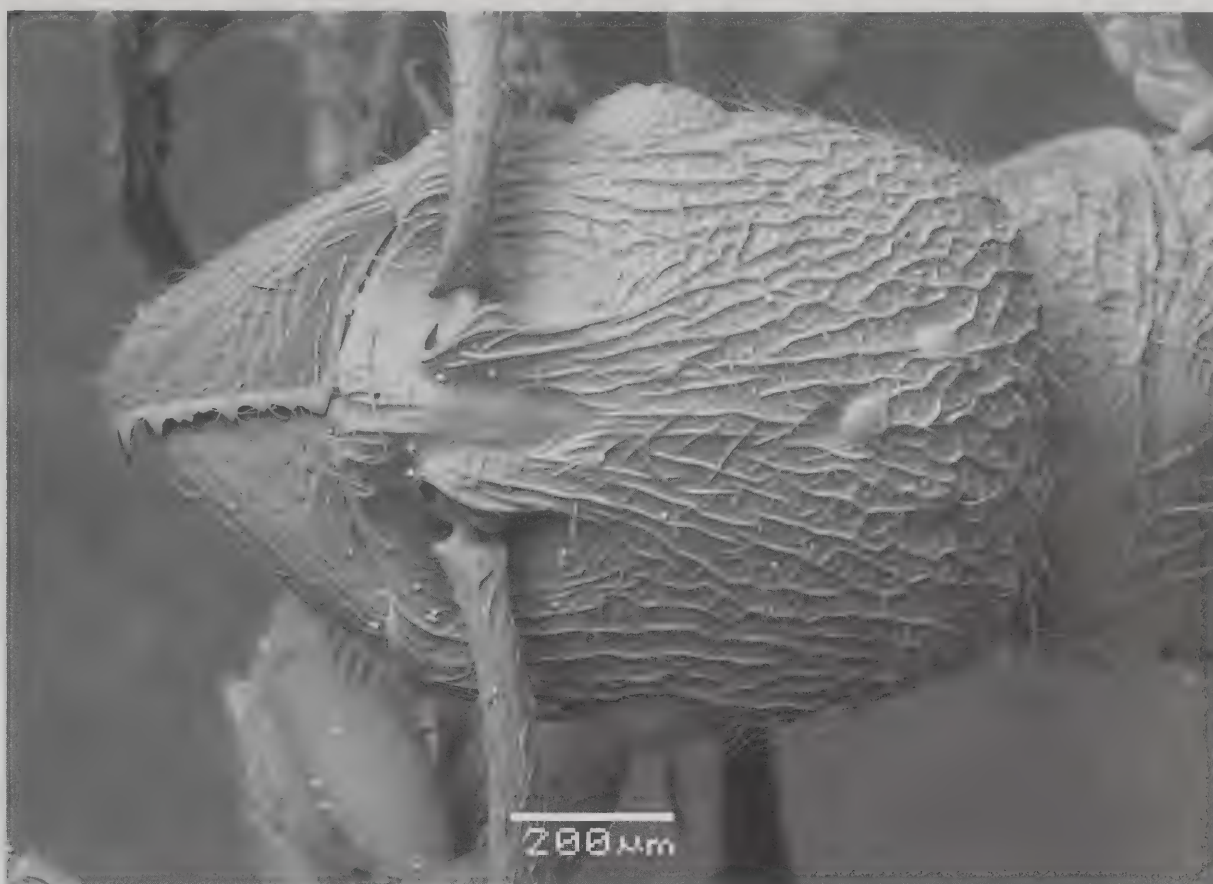
Fig. 46 - *Stenamma sardoum.* Gyne, head in full face view. / Regina, capo in visione frontale. (Photo / Foto Michele Zilioli).

Fig. 47 - *Stenamma siculum.* Holotype gyne, head in full face view. / Regina olotipo, capo in visione frontale. (Photo / Foto Michele Zilioli).
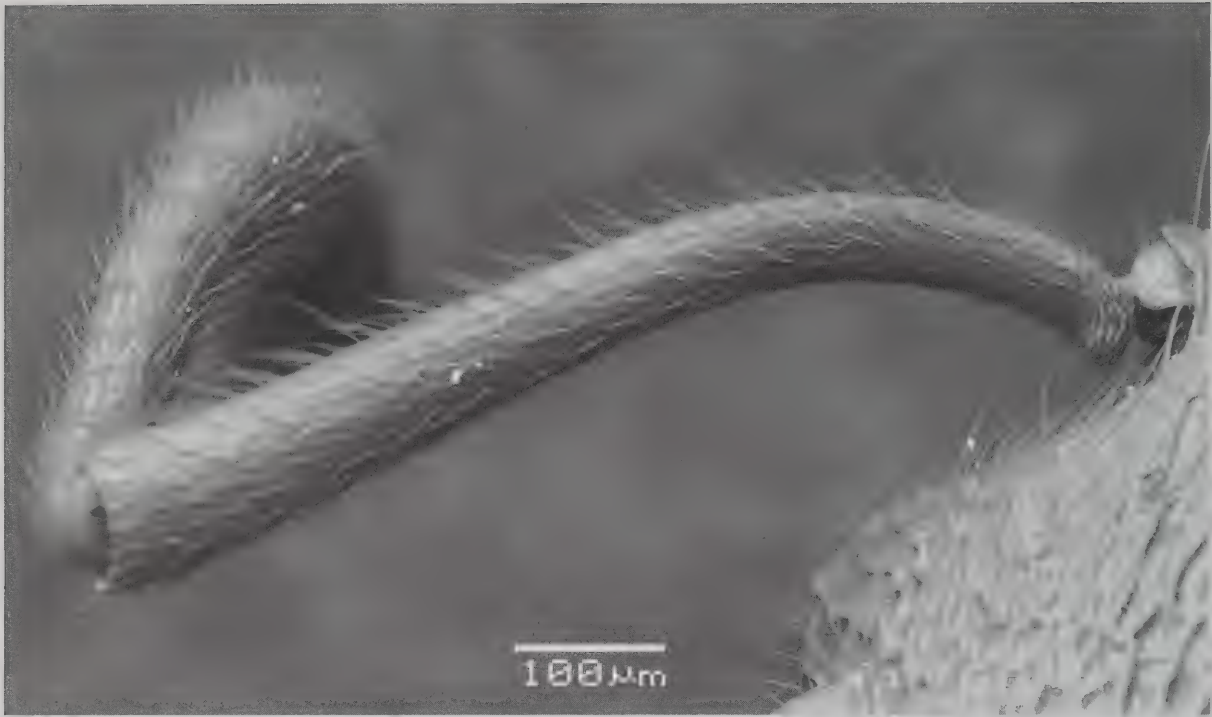
Fig. 48 - *Stenamma siculum*. Holotype gyne, scape in posterior view. / Regina olotipo, scapo in visione posteriore. (Photo / Foto Michele Zilioli).
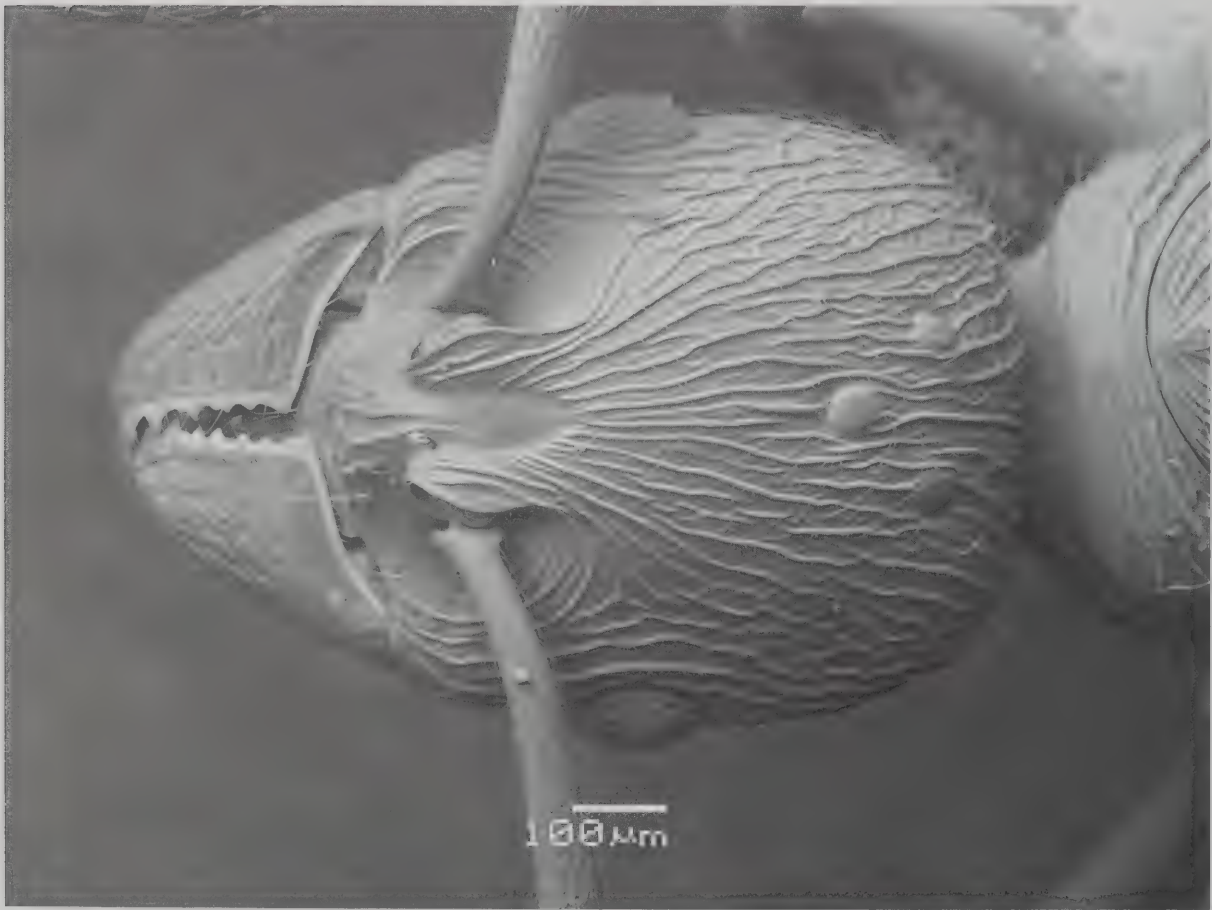
Fig. 49 - *Stenamma striatulum*. Gyne, head in full face view. / Regina, capo in visione frontale. (Photo / Foto Michele Zilioli).

Fig. 50 - *Stenamma westwoodii.* Gyne, head in full face view. / Regina, capo in visione frontale. (Photo / Foto Michele Zilioli).

Fig. 51 - *Stenamma debile.* Gyne, mesosoma in dorsal view. / Regina, mesosoma in visione dorsale. (Photo / Foto Michele Zilioli).
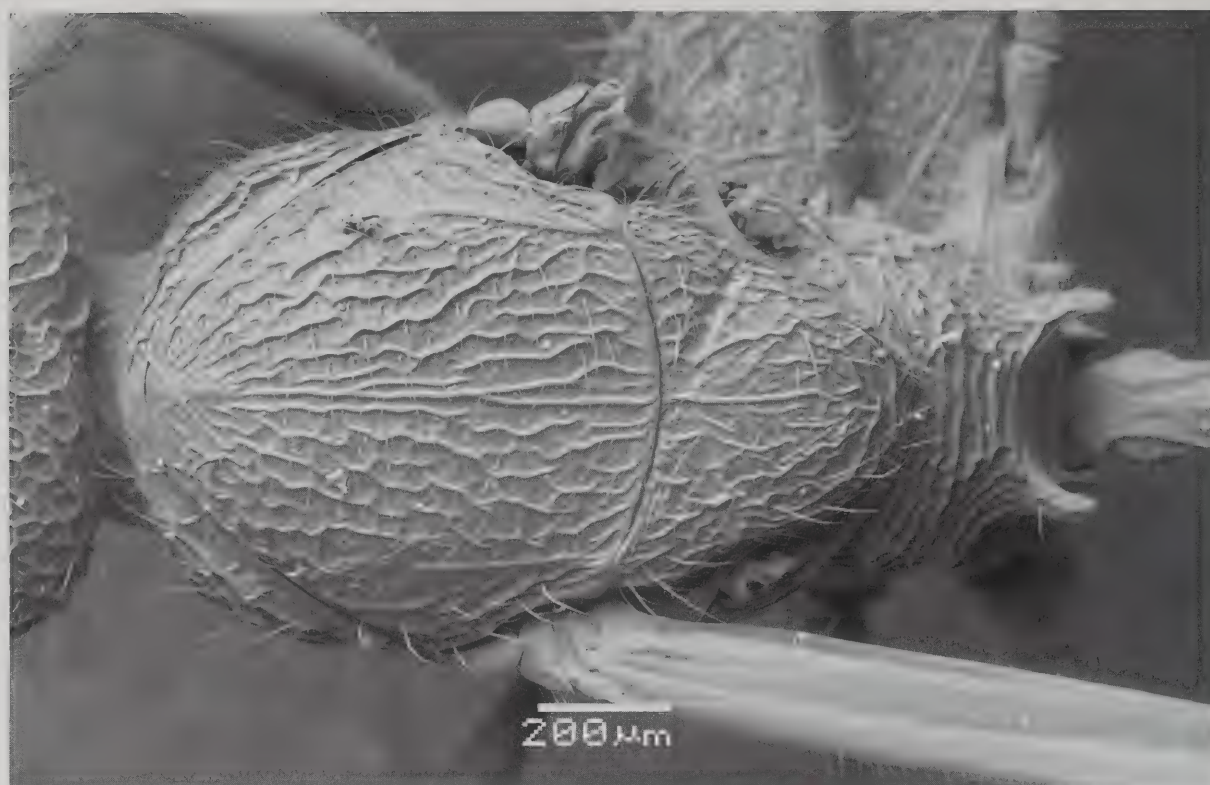
Fig. 52 - *Stenamma petiolatum.* Gyne, mesosoma in dorsal view. / Regina, mesosoma in visione dorsale. (Photo / Foto Michele Zilioli).

Fig. 53 - *Stenamma sardoum.* Gyne, mesosoma in dorsal view. / Regina, mesosoma in visione dorsale. (Photo / Foto Michele Zilioli).

Fig. 54 - *Stenamma siculum.* Holotype gyne, mesosoma in dorsal view. / Regina olotipo, mesosoma in visione dorsale. (Photo / Foto Michele Zilioli).

Fig. 55 - *Stenamma striatulum.* Gyne, mesosoma in dorsal view. / Regina, mesosoma in visione dorsale. (Photo / Foto Michele Zilioli).

Fig. 56 - *Stenamma westwoodii.* Gyne, mesosoma in dorsal view. / Regina, mesosoma in visione dorsale. (Photo / Foto Michele Zilioli).

Fig. 57 - *Stenamma debile.* Male in profile. / Maschio in visione laterale. (Photo / Foto Michele Zilioli).

Fig. 58 - *Stenamma siculum.* Paratype male in profile. / Maschio paratipo in visione laterale. (Photo / Foto Michele Zilioli).
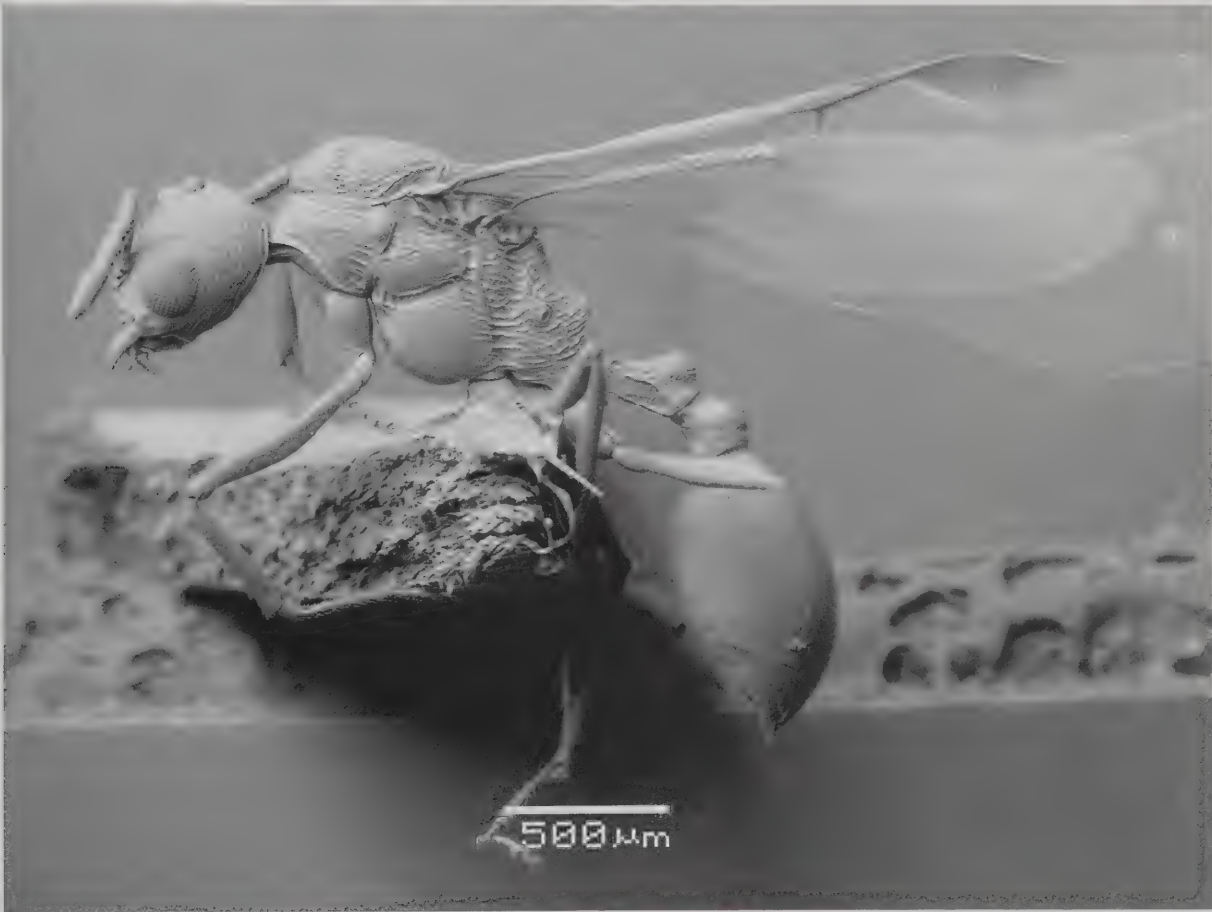
Fig. 59 - *Stenamma striatulum*. Male in profile. / Maschio in visione laterale. (Photo / Foto Michele Zilioli).
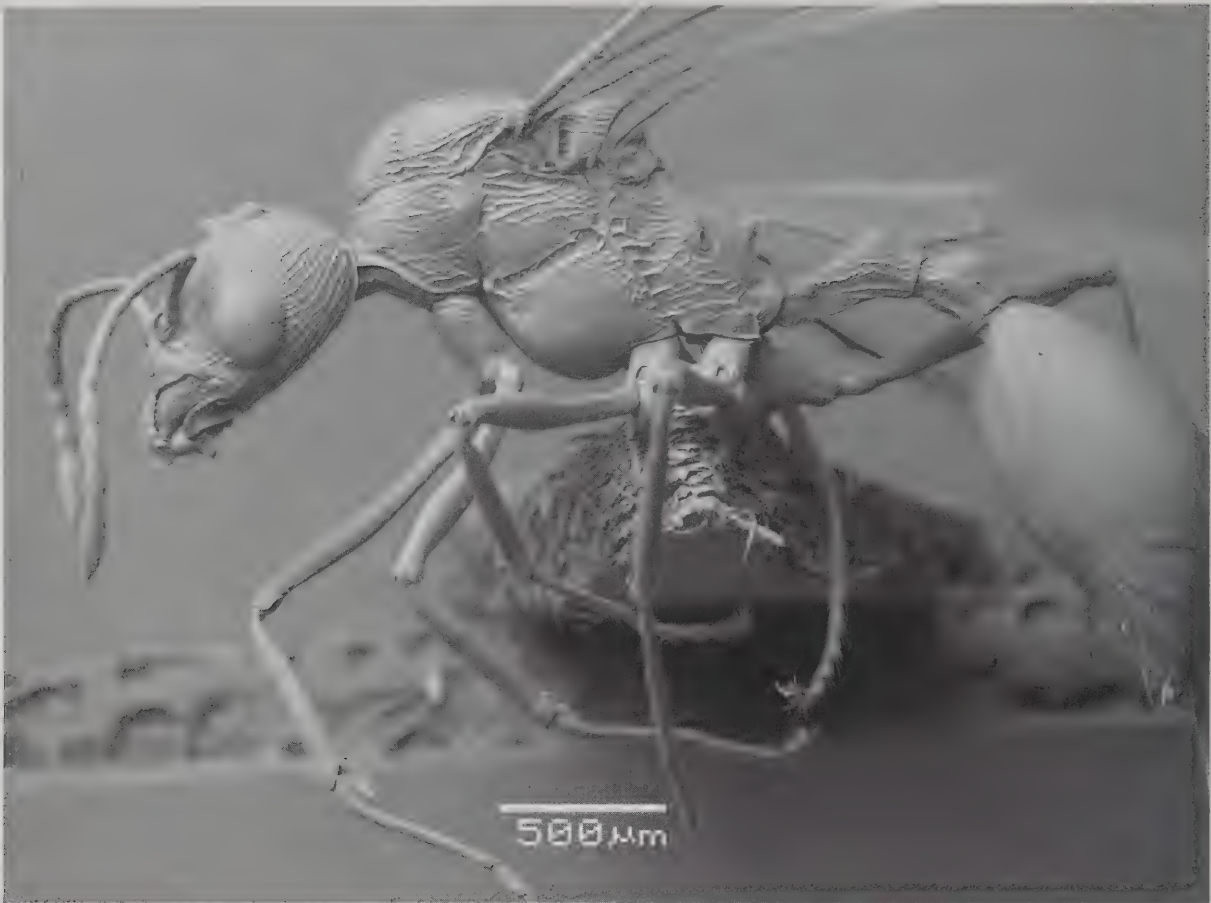
Fig. 60 - *Stenamma westwoodii*. Male in profile. / Maschio in visione laterale. (Photo / Foto Michele Zilioli).

Fig. 61 - *Stenamma debile*. Male, head in full face view. / Maschio, capo in visione frontale. (Photo / Foto Michele Zilioli).

Fig. 62 - *Stenamma zanoni.* Paratype male, head in full face view. / Maschio paratipo, capo in visione frontale. (Photo / Foto Michele Zilioli).

Fig. 63 - *Stenamma siculum.* Paratype male, head in full face view. / Maschio paratipo, capo in visione frontale. (Photo / Foto Michele Zilioli).
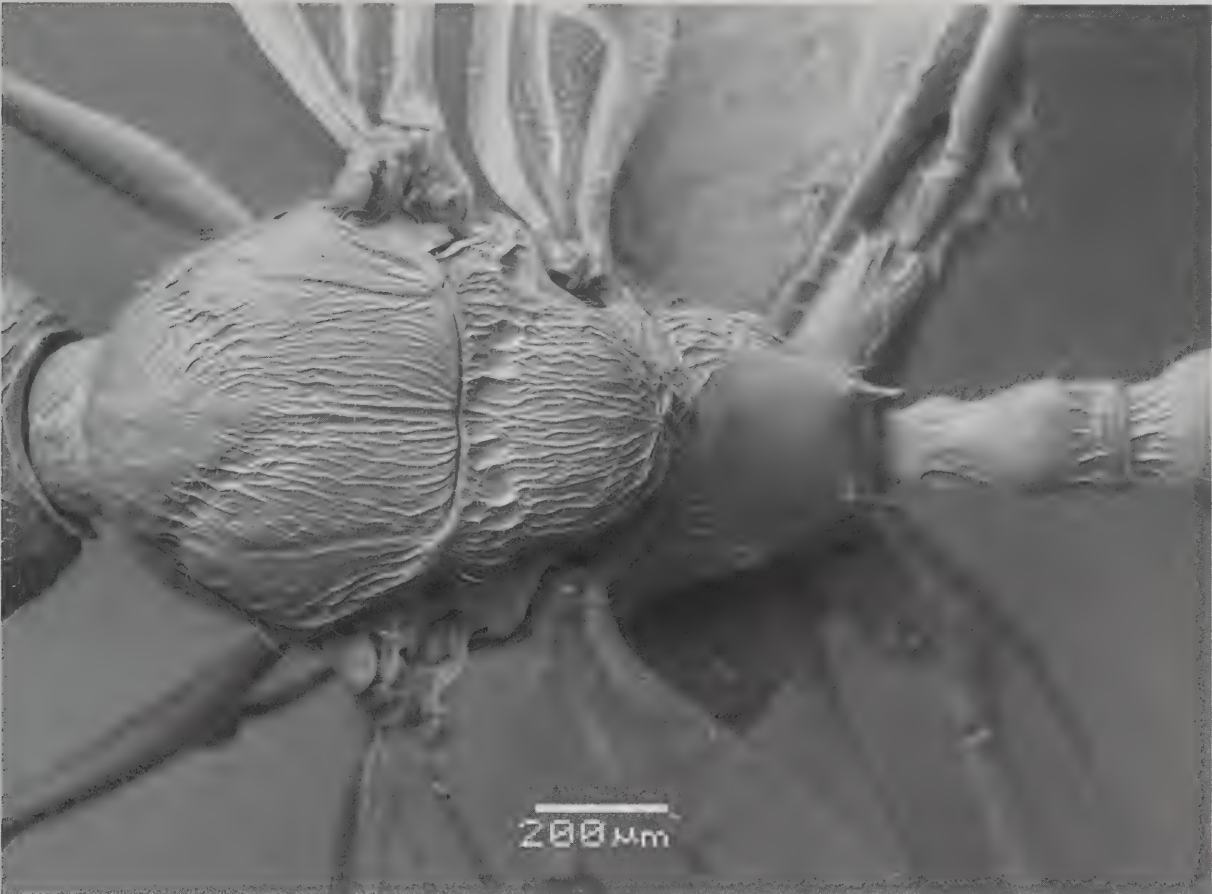
Fig. 66 - *Stenamma debile.* Male, mesosoma in dorsal view. / Maschio, mesosoma in visione dorsale. (Photo / Foto Michele Zilioli).

Fig. 67 - *Stenamma zanoni.* Paratype male, mesosoma in dorsal view. / Maschio paratipo, mesosoma in visione dorsale. (Photo / Foto Michele Zilioli).
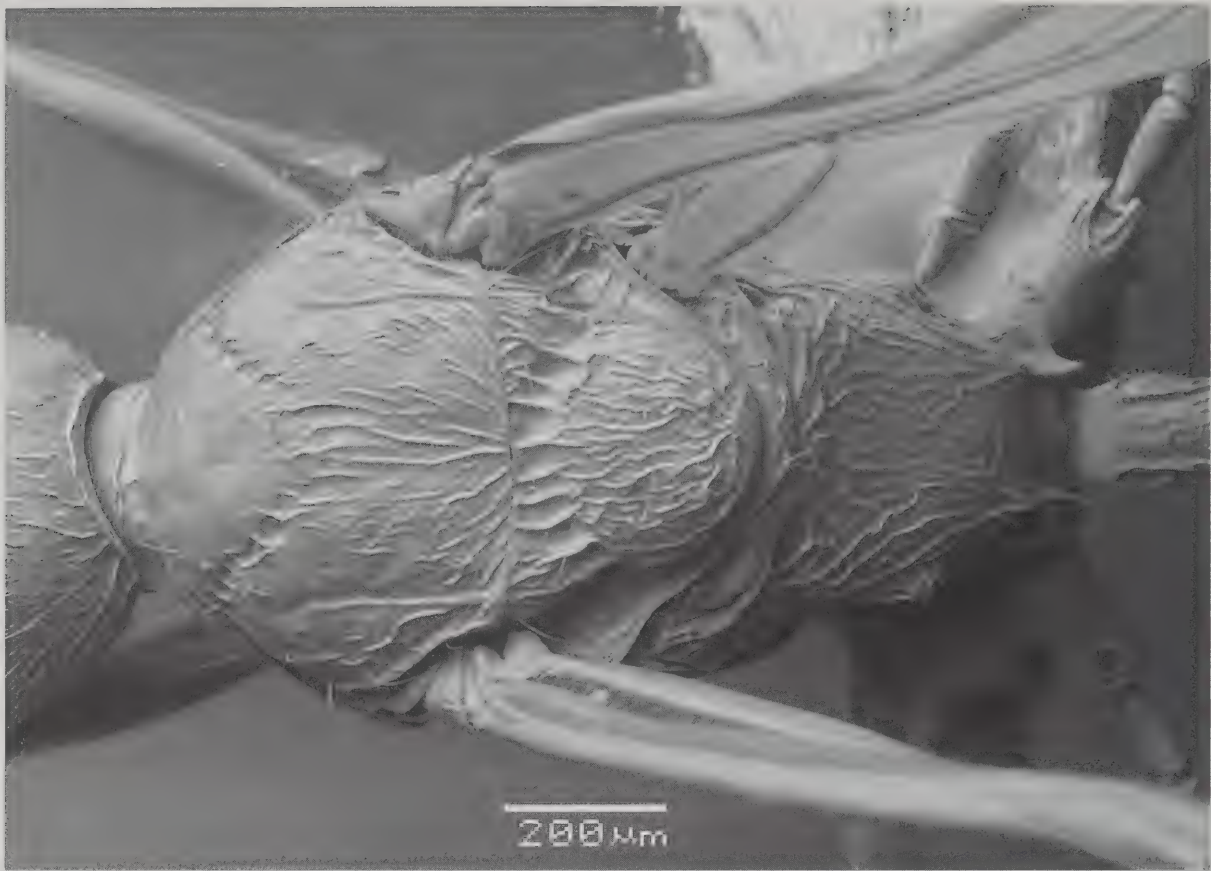
Fig. 68 - *Stenamma siculum.* Paratype male, mesosoma in dorsal view. / Maschio paratipo, mesosoma in visione dorsale. (Photo / Foto Michele Zilioli).
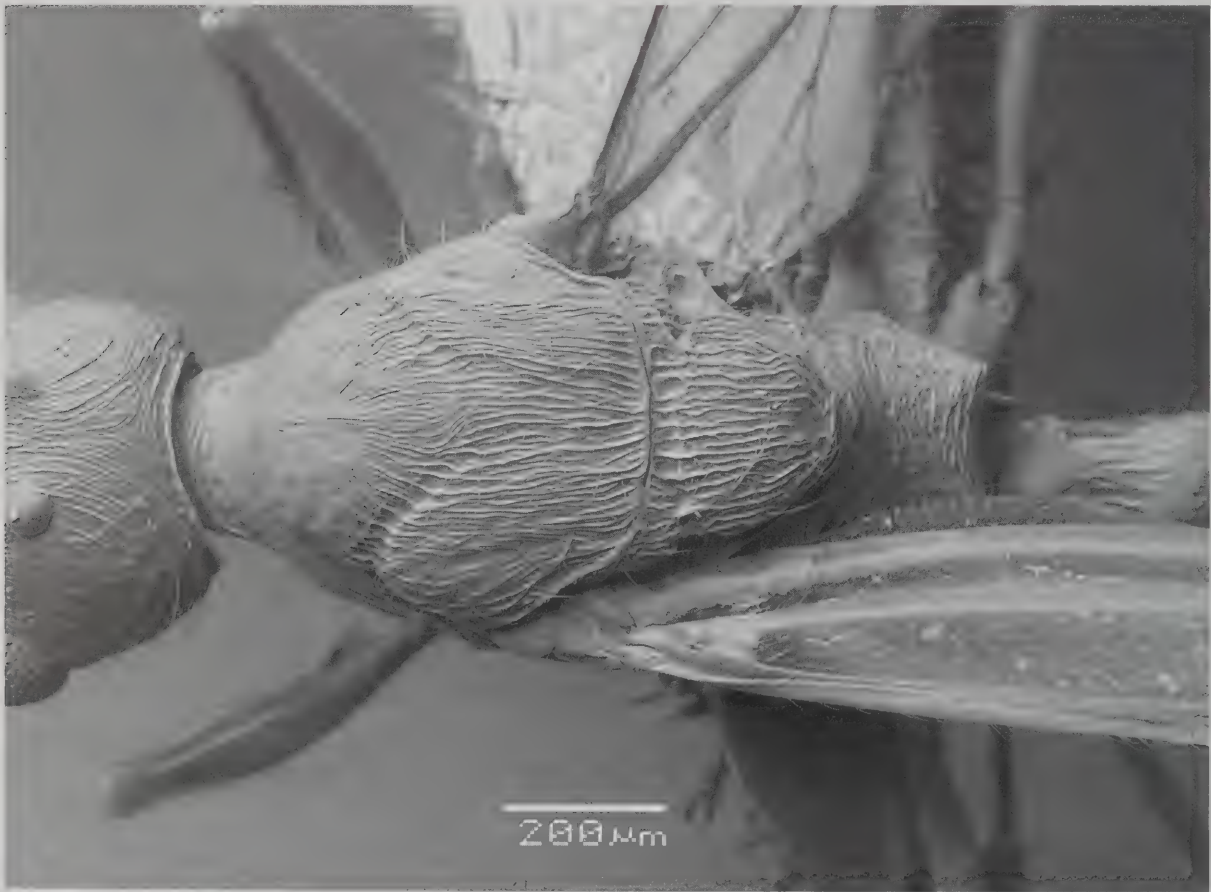
Fig. 69 - *Stenamma striatulum.* Male, mesosoma in dorsal view. / Maschio, mesosoma in visione dorsale. (Photo / Foto Michele Zilioli).

Fig. 72 - *Stenamma zanoni.* Paratype worker, metatibia in posterior view. / Operaia paratipo, metatibia in visione posteriore. (Photo / Foto Michele Zilioli).

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APPENDIX 1. Morphometric tables.

Tab. 1 – Morphometric data of workers. / Dati morfometrici delle operaie.

	debile (n=71)	*petiolatum* (n=3)	*sardoum* (n=21)	*striatulum* (n= 24)	*westwoodii* (n=4)	*zanoni* (n=8)	*africanum* (n=12)
TL	2.9–4.3	4.8–5.0	3.3–4.3	2.9–3.4	3.7–4.3	4.2–4.7	3.5–4.1
HL	0.68–0.97	1.03–1.10	0.81–0.91	0.67–0.78	0.83–0.92	0.94–1.02	0.86–0.95
HW	0.59–0.84	0.85–0.91	0.67–0.77	0.57–0.67	0.68–0.78	0.77–0.84	0.69–0.78
CI	82–90	83	82–85	83–89	82–86	80–84	80–84
SL	0.50–0.72	0.93–0.98	0.63–0.70	0.53–0.62	0.63–0.70	0.73–0.82	0.68–0.76
SI	79–91	108–109	89–96	89–97	89–93	95–99	95–100
PCI	24–33	31–33	25–34	26–34	18–23	25–31	23–31
PnW	0.40–0.55	0.60–0.67	0.48–0.51	0.38–0.46	0.46–0.52	0.52–0.59	0.47–0.54
AL	0.83–1.17	1.32–1.43	0.95–1.11	0.77–0.97	1.05–1.15	1.21–1.30	1.00–1.13
PSI	1.20–1.84	1.72–2.00	1.58–1.88	1.59–2.00	1.22–1.52	1.19–1.64	1.20–1.70
PeL	0.28–0.40	0.52–0.55	0.37–0.42	0.28–0.35	0.37–0.43	0.42–0.46	0.37–0.43
PPL	0.19–0.27	0.31–0.33	0.23–0.29	0.18–0.21	0.25–0.28	0.23–0.25	0.23–0.26
PeH	0.18–0.24	0.25	0.19–0.23	0.18–0.22	0.21–0.25	0.24–0.25	0.20–0.24
PPH	0.18–0.26	0.24–0.25	0.18–0.23	0.18–0.23	0.22–0.25	0.24–0.26	0.20–0.23
PeW	0.14–0.19	0.19–0.20	0.15–0.18	0.14–0.17	0.16–0.20	0.17–0.20	0.14–0.17
PPW	0.19–0.25	0.27	0.19–0.23	0.19–0.23	0.23–0.26	0.22–0.25	0.20–0.23
PI1	61–74	57–60	62–69	57–67	65–68	51–57	56–65
PI2	46–54	60–64	51–57	46–55	54–55	52–56	51–60
MTL	0.43–0.65	0.82–0.89	0.56–0.65	0.43–0.52	0.59–0.67	0.68–0.75	0.59–0.67
TI	72–83	96–98	81–89	73–81	83–87	85–90	82–92

Tab. 2 - Morphometric data of gynes. / Dati morfometrici delle regine.

	debile (n=15)	*petiolatum* (n=2)	*sardoum* (n=3)	*siculum* (n=12)	*striatulum* (n= 10)	*westwoodii* (n=3)	*africanum* (n=1)	*msilanum* (n=1)
TL	4.0–4.7	5.4–5.7	4.4–5.0	4.6–5.1	3.5–3.8	4.5–4.7	4.9	4.7
HL	0.82–0.93	1.08	0.92–1.01	0.94–1.02	0.75–0.80	0.91–0.95	1.02	0.94
HW	0.71–0.82	0.88–0.93	0.79–0.85	0.77–0.84	0.65–0.71	0.75–0.79	0.87	0.81
CI	84–91	81–86	84–86	82–84	85–90	82–84	85	86
SL	0.60–0.67	0.97–1.00	0.71–0.76	0.77–0.82	0.59–0.62	0.70–0.72	0.79	0.72
SI	79–86	108–110	89–90	97–100	86–91	91–93	91	89
PCI	26–35	35–36	30–34	29–35	24–32	22–23	32	31
AL	1.21–1.34	1.57–1.58	1.28–1.40	1.32–1.50	1.02–1.11	1.32–1.35	1.48	1.32
PSI	1.60–2.00	1.76–2.00	1.60–2.10	1.50–1.80	1.61–2.14	1.61–1.84	1.57	1.73
ScW	0.61–0.68	0.76–0.79	0.64–0.68	0.66–0.74	0.52–0.56	0.63–0.67	0.75	0.64
MnL	0.87–1.00	1.15–1.16	0.92–1.01	0.95–1.11	0.70–0.79	0.94–0.99	1.11	0.93
PeL	0.40–0.46	0.59	0.47–0.50	0.49–0.54	0.32–0.38	0.46–0.49	0.54	0.45
PPL	0.25–0.30	0.35–0.36	0.31–0.33	0.30–0.34	0.20–0.23	0.28–0.31	0.27	0.28
PeH	0.23–0.27	0.27	0.25	0.24–0.27	0.23–0.25	0.25–0.26	0.27	0.27
PPH	0.25–0.29	0.27	0.24–0.26	0.23–0.26	0.24–0.25	0.26–0.29	0.29	0.28
PeW	0.19–0.22	0.20–0.22	0.20–0.21	0.18–0.21	0.16–0.20	0.20–0.21	0.21	0.19
PPW	0.25–0.30	0.28–0.29	0.26–0.28	0.24–0.28	0.23–0.27	0.27–0.31	0.28	0.28
PI1	54–68	59–61	66–69	59–68	58–66	61–64	50	62
PI2	52–59	63–67	59	62–66	49–54	60–62	62	56
MTL	0.59–0.70	0.93	0.66–0.73	0.72–0.79	0.50–0.57	0.67–0.72	0.74	0.71
TI	77–87	100–106	84–88	90–96	77–82	85–96	85	88

Tab. 3 - Morphometric data of males. / Dati morfometrici dei maschi.

	debile (n=15)	*siculum* (n=6)	*striatulum* (n=3)	*westwoodii* (n=2)	*zanoni* (n=2)
TL	3.2–4.0	3.4–4.5	3.1–3.4	3.8–4.0	4.3–4.6
HL	0.55–0.67	0.65–0.73	0.55–0.56	0.64–0.73	0.68–0.77
HW	0.46–0.58	0.54–0.62	0.47–0.48	0.58–0.62	0.57–0.65
CI	83–88	82–85	85–86	85–91	84
SL	0.17–0.27	0.29–0.36	0.17–0.20	0.22–0.25	0.33–0.36
SI	35–55	53–64	36–42	38–40	55–58
AL	1.07–1.40	1.19–1.43	1.05–1.12	1.27–1.35	1.38–1.50
ScW	0.56–0.67	0.58–0.71	0.50–0.54	0.59–0.65	0.65–0.73
MnL	0.72–0.98	0.79–0.97	0.74–0.77	0.88–0.97	0.94–1.06
PeL	0.35–0.44	0.44–0.50	0.31–0.34	0.39–0.45	0.47–0.50
PPL	0.19–0.29	0.24–0.27	0.19–0.20	0.24–0.28	0.25–0.27
PeH	0.15–0.21	0.17–0.22	0.20–0.21	0.21	0.20–0.25
PPH	0.16–0.23	0.18–0.21	0.19–0.20	0.22	0.21–0.25
PeW	0.13–0.18	0.16–0.19	0.16–0.17	0.19	0.16–0.20
PPW	0.20–0.27	0.21–0.26	0.21–0.23	0.26–0.27	0.23–0.27
PI1	50–68	54–59	59–62	62	53–54
PI2	69–82	78–82	66–71	67–73	77–82
MTL	0.69–0.89	0.82–0.99	0.60–0.64	0.88–0.91	0.93–1.04
TI	142–163	151–163	128–133	147–152	160–163

APPENDIX 2. Locality data of photographed specimens.

Species (sex or caste)	Photo's number: locality
Stenamma debile (worker)	**2**: ITALY, Piemonte, Barge (Cuneo), Giala loc., Comba Linsolero, 700 m, 13.iii.1992 (*G.B. Delmastro*) **9**, **17** (HOLOTYPUS of *S. orousseti*): FRANCE: Corsica, Cap Corse, between Santa Lucia and Pino, 275 m, 15.iv.1984 (*Orousset*) **8**, **16**, **24**, **31**: ITALY, Sardegna, Domusnovas (Carbonia-Iglesias), Sa Duchessa env., 320 m, UTM WGS84 32S 0466164 4358209, 12.XI.2006, vaglio, (*M. Bardiani, G. Nardi, M. Zapparoli, D. Whitmore*) **71**: ITALY, Toscana, Parco Maremma-Uccellina, Alberese (Grosseto), staz. D, 2.vi.1988 (*P. Cenzi*)
S. debile (gyne)	**38**, **44**, **51**: ITALY, Puglia, Acquaviva delle Fonti (Bari), 16.x.1988 (*L. De Marzo*)
S. debile (male)	**57**, **61**, **66**: ITALY, Toscana, Colognole (Livorno), 150 m, 17.x-2.xi.2006, malaise trap (*F. Iaccarino & F. Bongianni*)
S. petiolatum (worker)	**3**, **10**, **18**, **25**, **32**: ITALY, Toscana, Mt. Argentario (Grosseto) (*A. Dodero*)
S. petiolatum (gyne)	**39**, **45**, **52**: ITALY, Liguria, Genova, xi.1901 (*E. Borgioli*)
S. sardoum (worker)	**4**, **33**: ITALY, Sardegna, Iglesias (Carbonia-Iglesias), loc. Mamenga, 610 m, 1.iii.2006, soil sifting (*L. Fancello*) **11**, **19**, **26** (PARALECTOTYPUS): ITALY, Sardegna: Aritzo (Nuoro), xi.1911 (*D. Dodero*)
S. sardoum (gyne)	**40**, **46**, **53**: ITALY, Sardegna, Marganai Mts. (Carbonia-Iglesias), 700 m, 21.x-17.xi.2003, malaise trap (*Birtele, Cerretti, Minari, Tisato & Whitmore*)
S. siculum (gyne)	**5**, **41**, **47**, **48**, **54** (HOLOTYPUS): ITALY, Sicilia, Corleone (Palermo), fraz. Ficuzza, 680 m, UTM 3 357272 4194090, 9.xii.2003-24.II.2004, malaise trap (*D. Birtele, P. Cerretti, M. Tisato*)
S. siculum (male,)	**58**, **63**, **68** (PARATYPUS): ITALY, Sicilia, Bosco della Ficuzza (Palermo), Torretta Torre, 940 m, I-II.2005, malaise trap (*A. Gatto*)
S. striatulum (worker)	**6**, **12**, **20**, **27**, **34**: ITALY, Piemonte, NE env. Frossasco (Torino), 325 m, 9.x.1991 (*G.B. Delmastro & G. Poidomani*)
S. striatulum (gyne)	**42**, **49**, **55**: ITALY, Piemonte, Nebbiuno env. (Novara), 31.vii.1996, (*F. Rigato*), adult born in captivity 5/8.viii.1996
S. striatulum (male)	**59**, **64**, **69**: ITALY, Friuli Venezia Giulia, Cervignano del Friuli (Udine), 23.viii.1986 (*M. Seriani*)
S. westwoodii (worker, gyne, male)	**13**, **21**, **28**, **35**, **43**, **50**, **56**, **60**, **65**, **70**: UNITED KINGDOM, Oxfordshire, Emmer Green, su 7/8773, 17.ix.1993 nest in flowerbed (*D.G. Notton*)
S. zanoni (worker)	**7**, **14**, **22**, **29**, **36** (HOLOTYPUS): ITALY, Friuli Venezia Giulia, Osoppo (Udine), 30.iv.2001, excavation nr. fortress (*D. Zanon*) **72** (PARATYPUS): same data as the holotype
S. zanoni (male)	**62**, **67**: ITALY, Lombardia, Monza park (Monza-Brianza), 25.ix.1985 (*F. Rigato*)
S. africanum (worker)	**15**, **23**, **30**, **37**: TUNISIA, forêt de Ghardimaou, Feidja El Feidja (and Feidja Ain Soltane), 13.IV.1989 (*Meregalli*)

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